

not in

MINUTES OF

CUSTOMER REVIEW MEETING

NASA/MSC

and

SPACE-GENERAL CORPORATION

ALSEP

12 JANUARY 1966

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FEB 4 1966

LAUNCHED SPACECRAFT CENTER
HOUSTON, TEXAS

N 71-72077

FACILITY FORM 602

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(THRU)	None
(CODE)	
(CATEGORY)	



SUMMARY

ALSEP CUSTOMER REVIEW MEETING

12 January 1966.

Space-General Corporation/NASA-MSC

at El Monte, California

- I. The fifth ALSEP Customer Review Meeting was convened in a general session with introductory remarks by B. J. Walker of Space-General.
- II. Attendees then dispersed into two major submeetings as follows:
 - A. Preliminary Systems Meeting
 - B. Experimenters' General Meeting
- III. Subsequently, attendees dispersed into satellite meetings as follows:
 - A. Plasma Probe/Magnetometer Meeting
 - B. Passive Seismometer Meeting
 - C. Active Seismometer Meeting
 - D. Electron/Proton Spectrometer Meeting
 - E. Suprathermal Ion Detector Meeting
 - F. Heat Flow Instrument Meeting
 - G. Systems Meeting
 - H. Structural/Thermal Meeting
 - I. Data Subsystem Meeting
 - J. Human Factors Meeting
 - K. Fever Meeting
 - L. Cost and Management Meeting
 - M. Incentive Meetings
 - N. Milestone Review Meeting
- IV. Subsequent to the above, all pertinent information gathered so review meeting of the ALSEP Project Manager in a course of time management and proceeded through the following flowchart arranged as Figure 10-1.

22 February 1968

I. Acknowledgments

NASA

R. W. Gersbach
 F. C. Miller
 O. H. Miller
 D. B. Murray
 C. Neffenson
 R. E. Pake
 D. G. Mizrahi
 J. C. Chavas (MSC/MSD)
 M. E. Knobek
 P. S. Morris (MS/MSD)
 J. L. Sizai
 V. R. Whaley

MSC

A. J. Repay
 P. Vian
 L. G. Smith
 R. M. McMurtry
 M. B. Collier
 S. J. Crossay
 J. M. Koenig
 L. A. Rasmussen
 J. P. Williams
 R. M. McEachern
 G. L. Miller
 C. M. Rugh
 J. M. Schedler
 A. C. Richmond

II. Introduction

The TEC presented a series of flights in which each flight of the Mission was preceded by a brief orbital checkout of the TEC prior to reentry. These flights are referred to as "pre-reentry flights".

The TEC presented a series of hardware malfunctions in two categories: cable problems and the loss of one or both insulation layers on the power control, "PAC" power transistors and their drivers. Insulation problems of significant magnitude did not appear until approximately the 10th flight.

On the 9th flight the original configuration had eight segments of 7-ohm, 1000 W resistors connected in series with each other in a single common enclosure. The resistors were mounted on a vertical plate, which was fastened to the interior side of the outer case. Each resistor had a heavy 100-ampere, 1000-volt fuse. This original configuration required a significant amount of time to cool down after each flight.

In addition to the cooling problem associated with the original configuration, there were difficulties in the electrical insulation.

III. Description of Problem

There were two types of insulation problems:

- Cable insulation problems
- Resistor insulation problems

IV. Analysis

There were two types of insulation problems:

- Cable insulation problems
- Resistor insulation problems

PROGRAM HARDWARE

1 Set Subsystems — No. 1 PROTOTYPE

1 System — No. 2 PROTOTYPE

1 System — QUALIFICATION SYSTEM

1 System — No. 1 FLIGHT SYSTEM

1 System — No. 2 FLIGHT SYSTEM

1 System — No. 3 FLIGHT SYSTEM

1 System — No. 4 FLIGHT SYSTEM

1 Set — FLIGHT SPARES

3. — MOCKUPS

2 — FLIGHT SIMULATORS

1 — THERMAL SIMULATOR

2 Sets — G.S.E.

1 Set — G.S.E. SPARES

2 Sets — TRAINING EQUIPMENT

1 Set — TRAINING EQUIPMENT SPARES

09/438

Fig. II A1

G.F.E. HARDWARE

- 2 —— PROTOTYPE MAGNETOMETER
- 2 —— PROTOTYPE PLASMA DETECTOR
- 2 —— PROTOTYPE SUPRATHERMAL ION DETECTOR
- 1 —— QUALIFICATION MAGNETOMETER
- 1 —— QUALIFICATION PLASMA DETECTOR
- 1 —— QUALIFICATION SUPRATHERMAL ION DETECTOR
- 1 —— QUALIFICATION I.P.U.
- 1 —— QUALIFICATION FUEL CASK
- 1 —— QUALIFICATION FUEL CAPSULE HANDLING TOOL

- as required
by mission
assignment
- { FLIGHT MAGNETOMETER
 - FLIGHT PLASMA DETECTOR
 - FLIGHT SUPRATHERMAL ION DETECTOR
 - 4 —— FLIGHT I.P.U.
 - 4 —— FLIGHT FUEL CASK
 - 4 —— FLIGHT FUEL CAPSULE HANDLING TOOL
 - 1 Set —— FLIGHT SPARES

09/441

SPARE HARDWARE

1 Set — STRUCTURAL/THERMAL SUBSYSTEM COMPONENTS
(assembly level hardware)

- 1 — I.P.U. (assembled)
 - 1 — FUEL CASK
 - 1 — FUEL CAPSULE HANDLING TOOL
 - 1 — CENTRAL PACKAGE WIRING HARNESS
 - 1 — DATA PROCESSOR
 - 1 — RECEIVER
 - 1 — TRANSMITTER
 - 1 — DUPLEXER
 - 1 — ANTENNA CABLE
 - 1 — P.D.U.
 - 1 — ANTENNA AIMING MECHANISM
 - 1 — ANTENNA
 - 1 — PASSIVE SEISMOMETER
 - 1 — ACTIVE SEISMOMETER
 - 1 — SUPRATHERMAL ION DETECTOR
 - 1 — PLASMA DETECTOR
 - 1 — HEAT FLOW
 - 1 — MAGNETOMETER
 - 1 — ELECTRON/PROTON SPECTROMETER
- 1 Set for — TRAINING EQUIPMENT
- 1 Set for — G.S.E.

INSTRUMENT HARDWARE

	A	B	FLIGHT SYSTEM NO.1	FLIGHT SYSTEM NO.2	FLIGHT SYSTEM NO.3	FLIGHT SYSTEM NO.4	SPARE	PROTO NO.1	PROTO NO.2	PROG. QUAL.	PROG. TOTAL QTY.
PASSIVE SEISMOMETER	X	X	X	X	X	X	X	X	X	X	8
MAGNETOMETER	X	X	-	-	-	-	X	X	X	X	6
PLASMA DETECTOR	X	X	-	-	-	-	X	X	X	X	6
SUPRATHERMAL ION DETECTOR	X	X	X	X	X	X	X	X	X	X	8
HEAT FLOW	X	X	X	X	X	X	X	X	X	X	8
ACTIVE SEISMOMETER	-	-	X	X	X	X	X	X	X	X	6
ELECTRON/PROTON SPECTROMETER	X	X	-	-	-	-	X	X	X	X	6

09/443

EXPLANATION OF EXPERIMENTAL RESULTS

12 January 1966

I. Description

A description of the SIS AEDS system is provided in a general section which includes all of the experiments. The description is summarized in the sections included in the tables below. Fig nos 17-21 which illustrate the idea of some phases of the experiment to R&D for consideration by management.

II. Documents Transmitted

Copies of each of the following documents were provided to the experimenters:

A. Draft Interface Spec for Data Link Control	10 January 1966
b. Mission Statement for Experiment	10 January 1966
C. ESD Report (Initial) (See Appendix I) (copies)	10 January 1966
D. Executive Action Report (Spec, Init, & ESD)	10 January 1966
E. Data Control and Management Project Information (Spec. ACP 23029)	7 January 1966
F. Executive Interim Agency Data Base Schematic, TELM 1601	10 January 1966
G. AEDS System Operational Data and Control Link (75 pages)	10 January 1966
H. Additional Interface Spec for Supplemental Data Control, AIRTEL/JOA	10 January 1966
J. List of Key Personnel	10 January 1966
K. ACP 23029 Project Report, Customer and TA Review Meeting	10 January 1966

FOREWORD

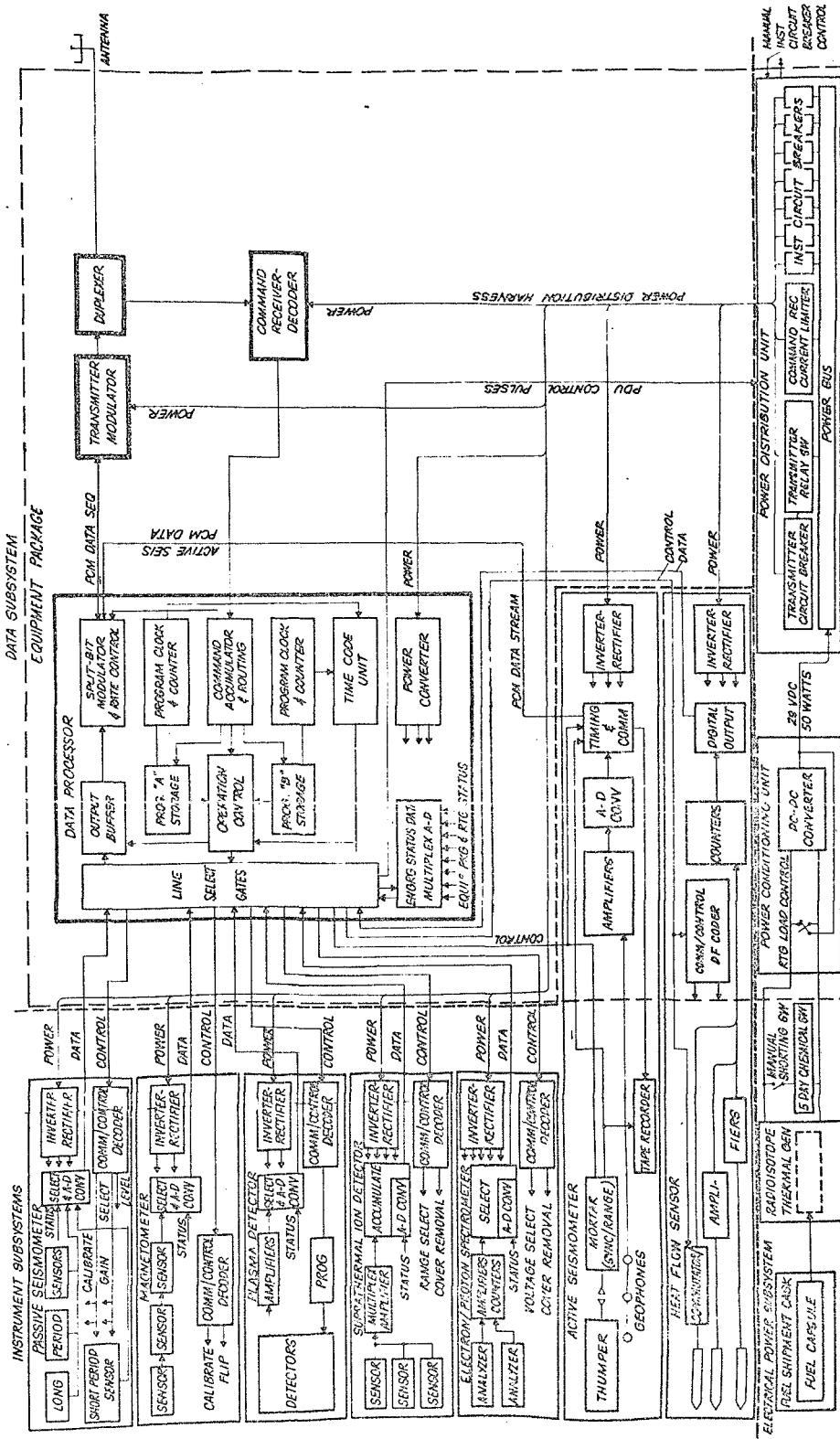
This brochure contains reproductions of presentation charts used in the ALSEP system and interface review, presented to ALSEP Principal Investigators at Space-General on 12 January 1966. The brochure includes information considered proprietary to Space-General, and should be handled accordingly.

SPACE-GENERAL CORPORATION

AL-2-0051

Fig. II B1

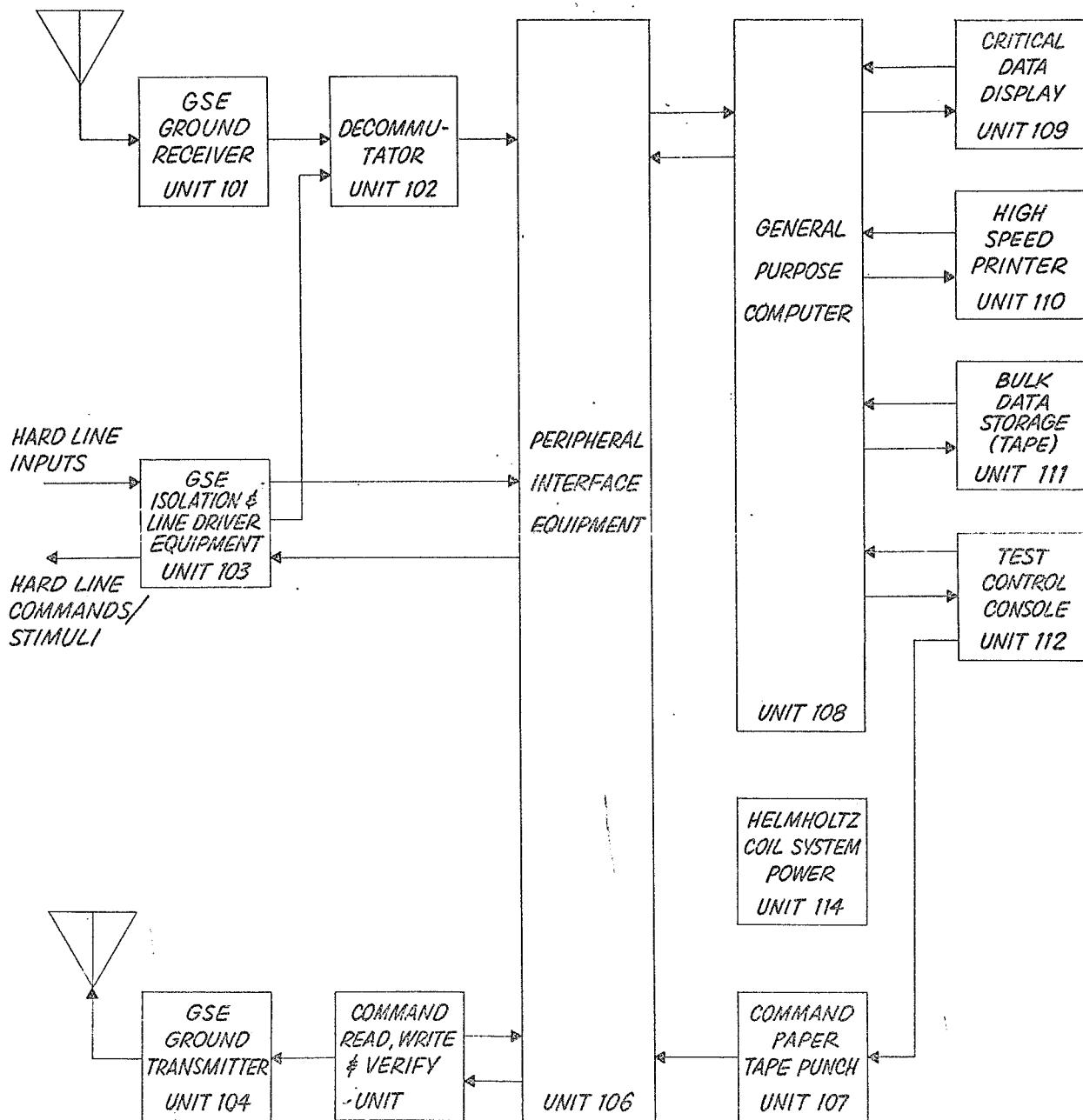
ALSEP SYSTEM BLOCK DIAGRAM



09/436

Fig. II B2

ALSEP GROUND SUPPORT EQUIPMENT



09/449

Fig. III B3

DATA REQUIREMENTS

SOURCE	NUMBER SCIENCE	NUMBER ENGR	BIT RATE CONTINUOUS	BPS PEAK
INSTRUMENTS			1080	1088
PASSIVE SEISMOMETER	7	5	752 (.2)	752 (.2)
MAGNETOMETER	3	7	90 (.4)	90 (.4)
PLASMA DETECTOR	8	4	72 (.2)	72 (.2)
SUPRATHERMAL ION DETECTOR	2	4	64 (.2)	64 (.2)
ELECTRON / PROTON SPECTROMETER	10	4	100 (.2)	100 (.2)
HEAT FLOW INST.	33	10	(.7)	8 (.7)
ACTIVE SEISMOMETER	7	5	(.2)	21,000 (.2)*
SUPPORT EQUIPMENT			1.2	1.2
DATA SUBSYSTEM	-	13	0.5	0.5
ELEC. POWER SUBSYS.	-	12	0.6	0.6
STRUC. / THERM. / SUBSYS.	-	5	<u>0.1</u>	<u>0.1</u>
GROUP A - PRIME INST.			980	980
GROUP B - PRIME INST.			819	827
ALL INSTRUMENTS			1081	1089
SYSTEM CAPABILITY			1280	20480

ALSEP WEIGHTS

SUPPORT EQUIPMENT

RTG ASSEMBLY

80.3

46.2

SUPPORT SUBSYSTEMS

18.1

C.P. STRUCTURE

16.0

AVAILABLE INSTRUMENT WEIGHT

69.7

GROUP A GROUP B ALL

INSTRUMENTS

59.5
(P) ONLY

61.7
(P) ONLY

98.6

MOUNTING STRUCTURE

8.0 8.5 10.0

PASSIVE SEISMOMETER

18.9 (P) 18.9 (P) 18.9

MAGNETOMETER

14.0 (P) - 14.0

PLASMA DETECTOR

} (P) 11.1 11.0

ELECTRON/PROTON SPECTROMETER

} 17.0 - 6.8

SUPRATHERMAL ION DETECTOR

7.5 (P) 7.5 (P) 7.5

HEAT FLOW INSTRUMENT

9.8 9.8 (P) 9.8

ACTIVE SEISMOMETER

- 17.0 (P) 17.0

ALSEP SYSTEM

155.5
6 INST.

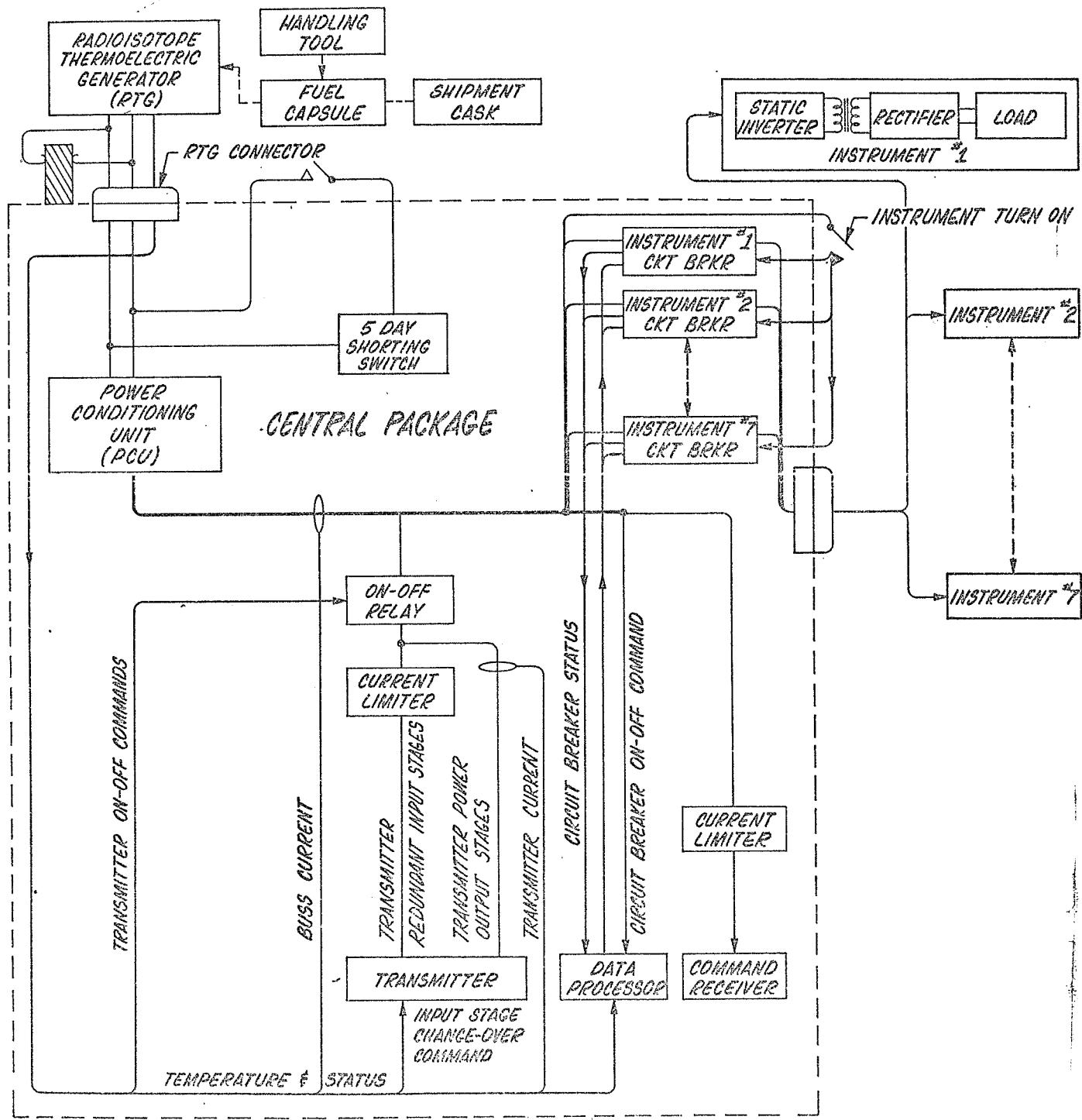
153.1
5 INST.

ALSEP POWER & RELIABILITY

	<u>POWER</u>	<u>WATTS</u>	<u>RELIABILITY</u>
	<u>CONTINUOUS</u>	<u>PEAK</u>	<u>ALLOCATION</u>
	<u>OPERATING</u>	<u>SIMULT</u>	
SUPPORT EQUIPMENT	16.5	17.3	
RTG ASSEMBLY (+50)			.990
SUPPORT SUBSYSTEMS	16.5	17.3	.953
STRUCTURE	—	—	.999
AVAILABLE INSTRUMENT POWER		32.7	
INSTRUMENTS	ALL 22.3	ALL 29.7	
PASSIVE SEISMOMETER	1.8	3.23	.994
MAGNETOMETER	2.0	6.33	.990
PLASMA DETECTOR	5.0	5.06	.990
ELECTRON/PROTON SPECTROMETER	3.5	3.51	.991
SUPRATHERMAL ION DETECTOR	3.5	3.56	.990
HEAT FLOW INSTRUMENT	6.5	6.54	.997
ACTIVE SEISMOMETER	—	1.51	.996
ALSEP SYSTEM (ALL INST.)		47.0	

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ALSEP POWER SUBSYSTEM BLOCK DIAGRAM



09/451

Fig. II B7

**ALSEP INSTRUMENT
POWER INTERFACE**

REFERENCED TO CENTRAL PACKAGE CONNECTOR

OUTPUT VOLTAGE (NO LOAD TO FULL LOAD) 29 VOLTS $\pm 1\%$ -4.0%

REGULATION (70% LOAD VARIATION) 2%

RIPPLE 100 mV.

**TRANSIENT RESPONSE FOR A 15 WATT
STEP LOAD CHANGE:**

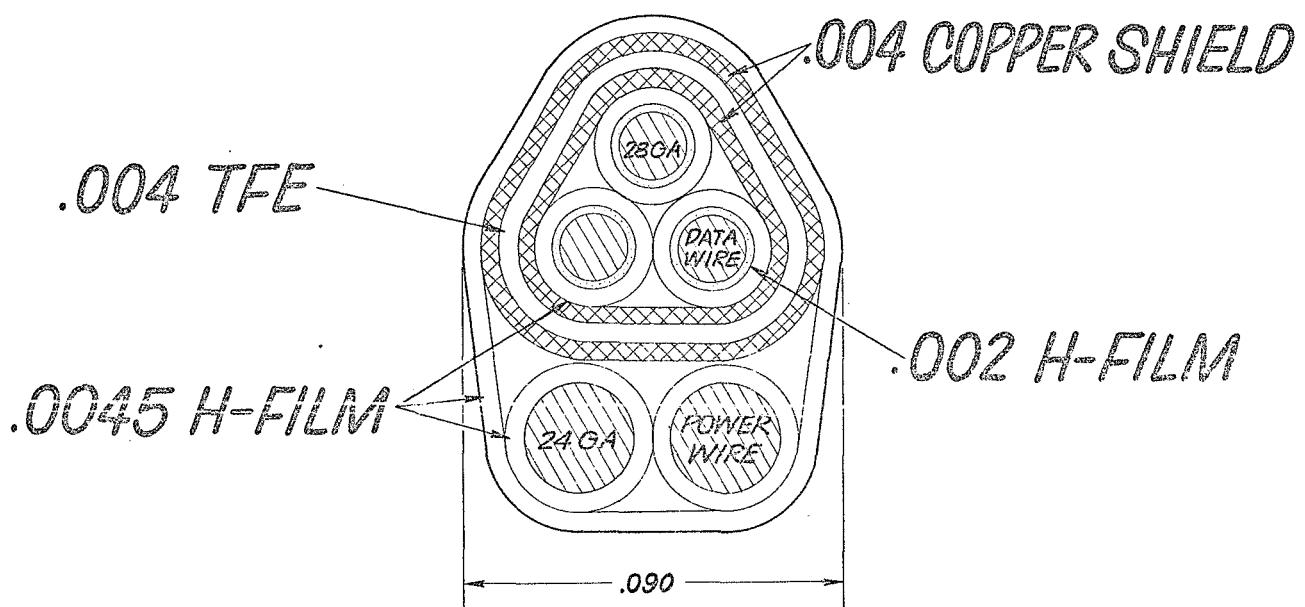
**RECOVERY TIME TO REGULATION ENVELOPE 50MS.
VOLTAGE EXCURSION FROM STEADY STATE $\pm 5\%$**

CURRENT LIMITER SETTING 150% RATED LOAD

CIRCUIT BREAKER SETTING 200% RATED LOAD

09/458

INSTRUMENT CABLE



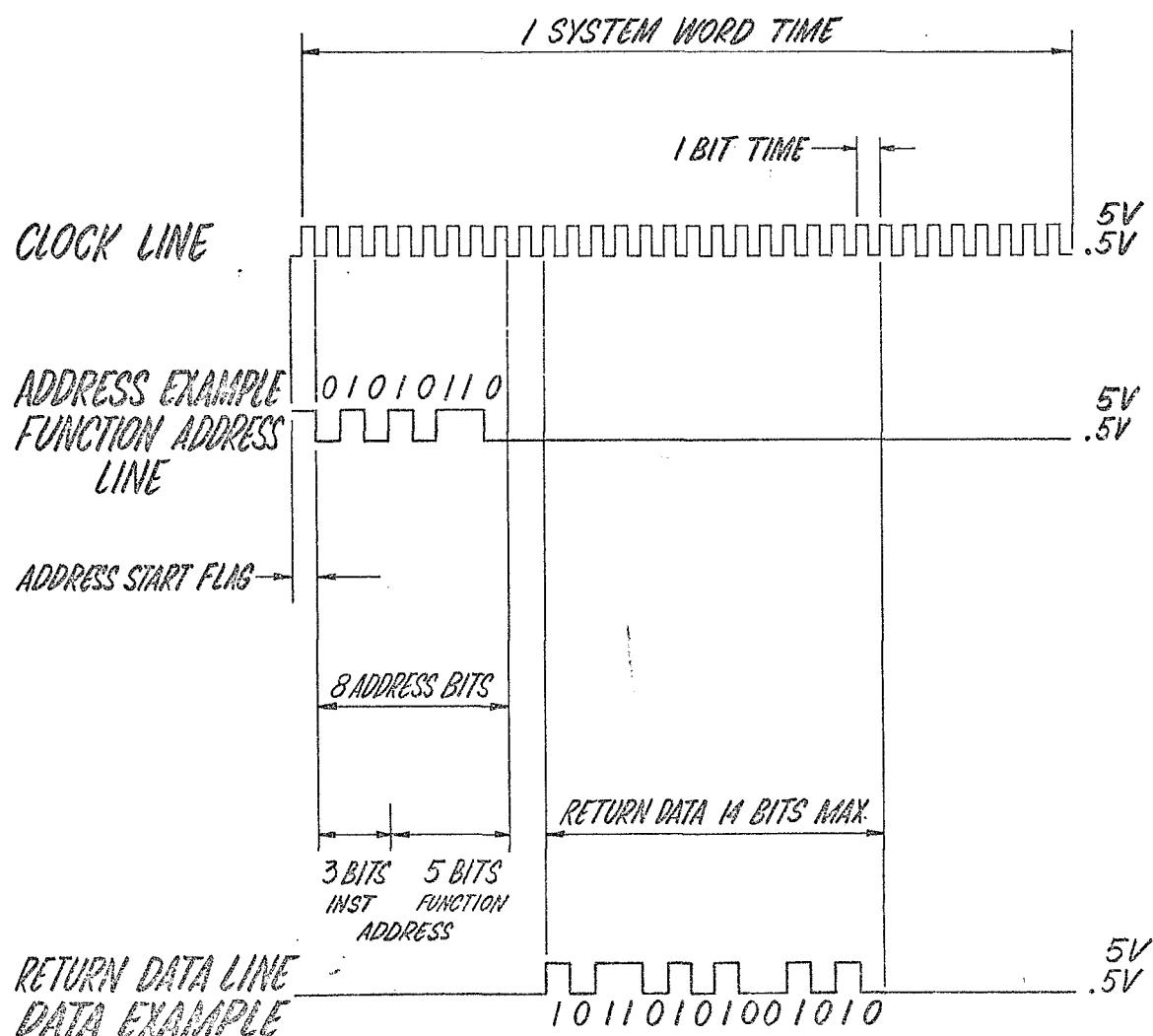
WT-14 LB/100 FT

POWER LEAD RESISTANCE - 7.1 OHM/100 FT AT 130°C

CONDUCTORS - STRANDED #135 ALLOY (99.3% COPPER)



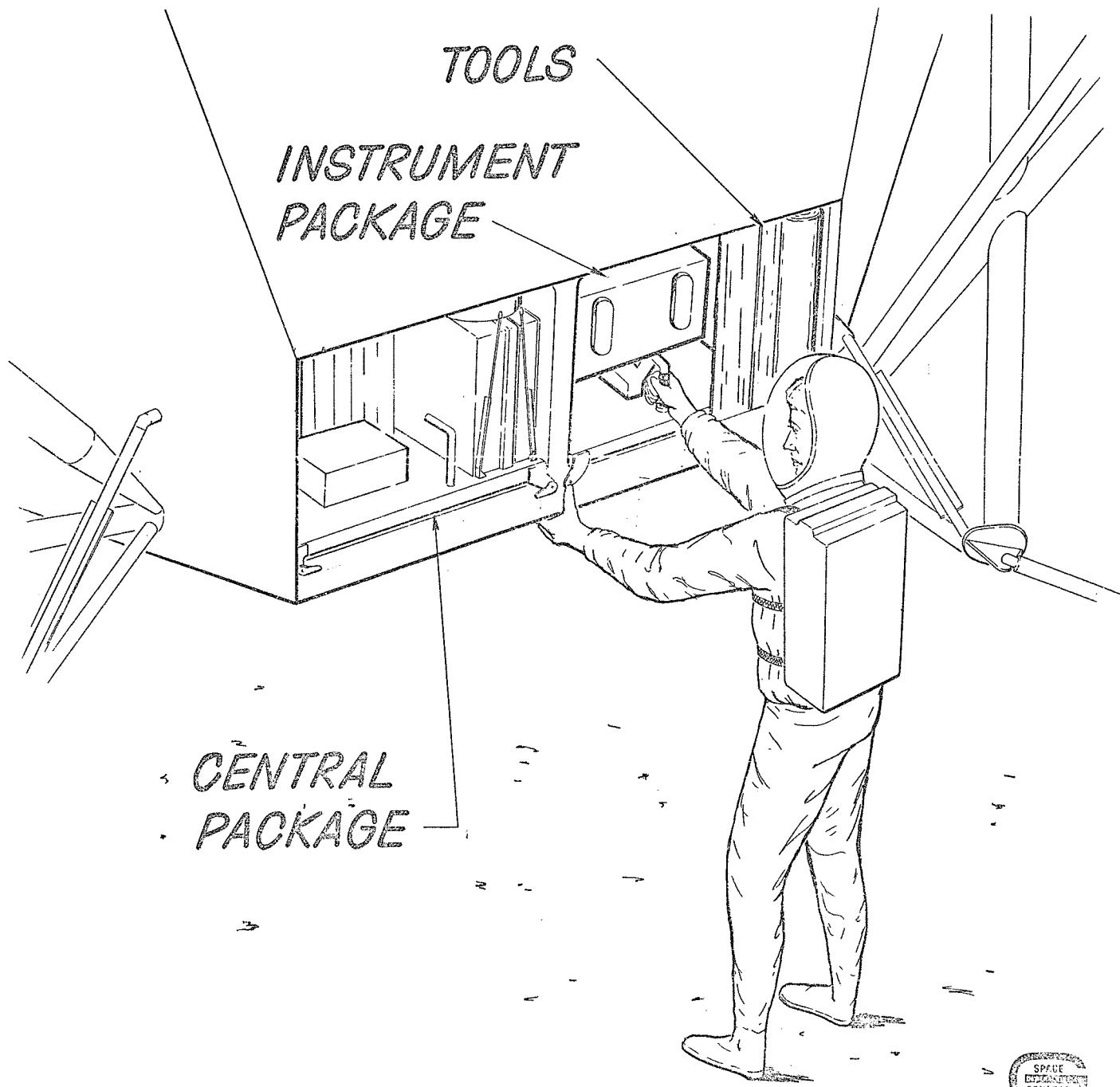
DATA INTERFACE TIMING DIAGRAM



09/446

Fig. II-B10

ALSEP PACKAGES STOWED IN LEM

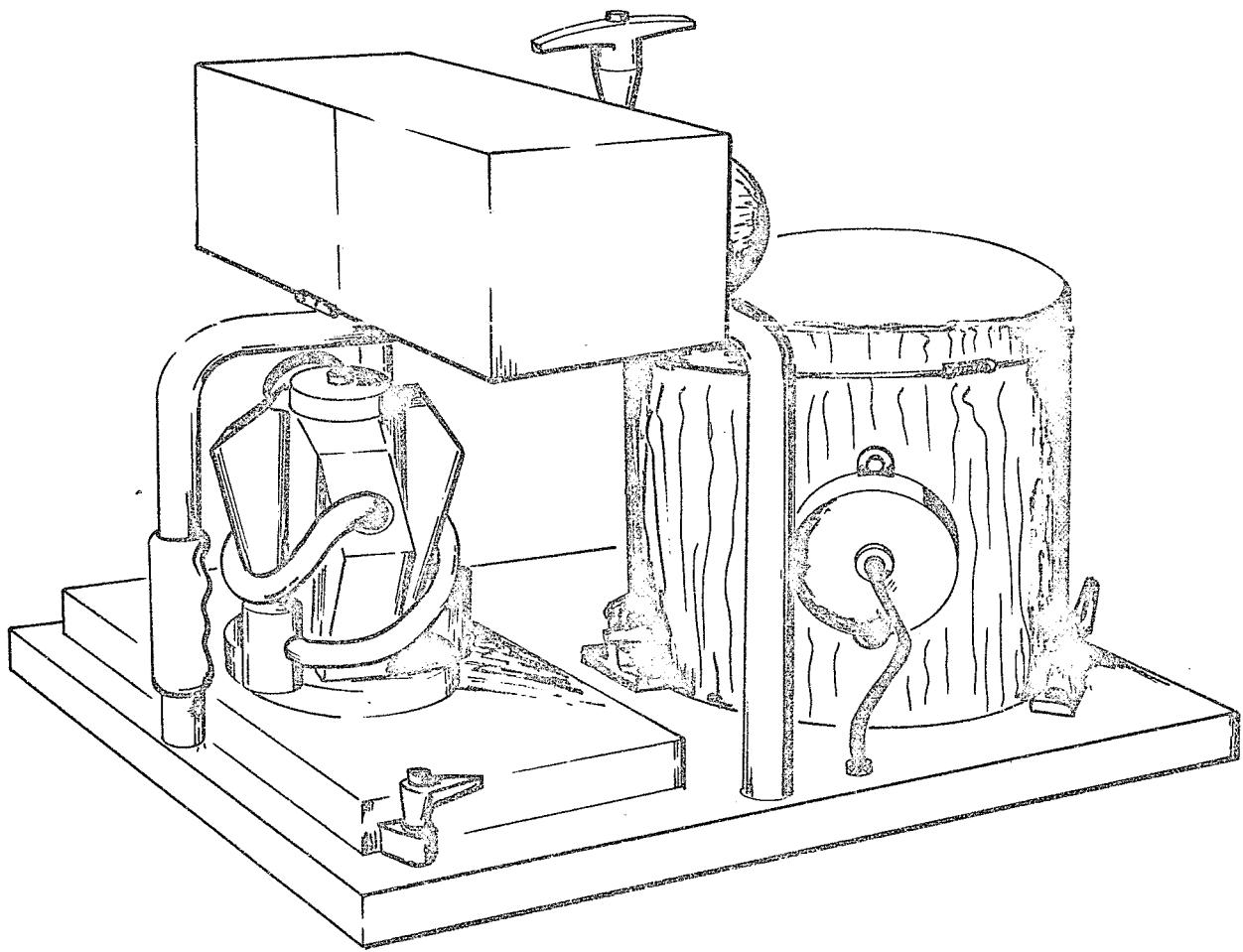


09/454



Fig. II B11

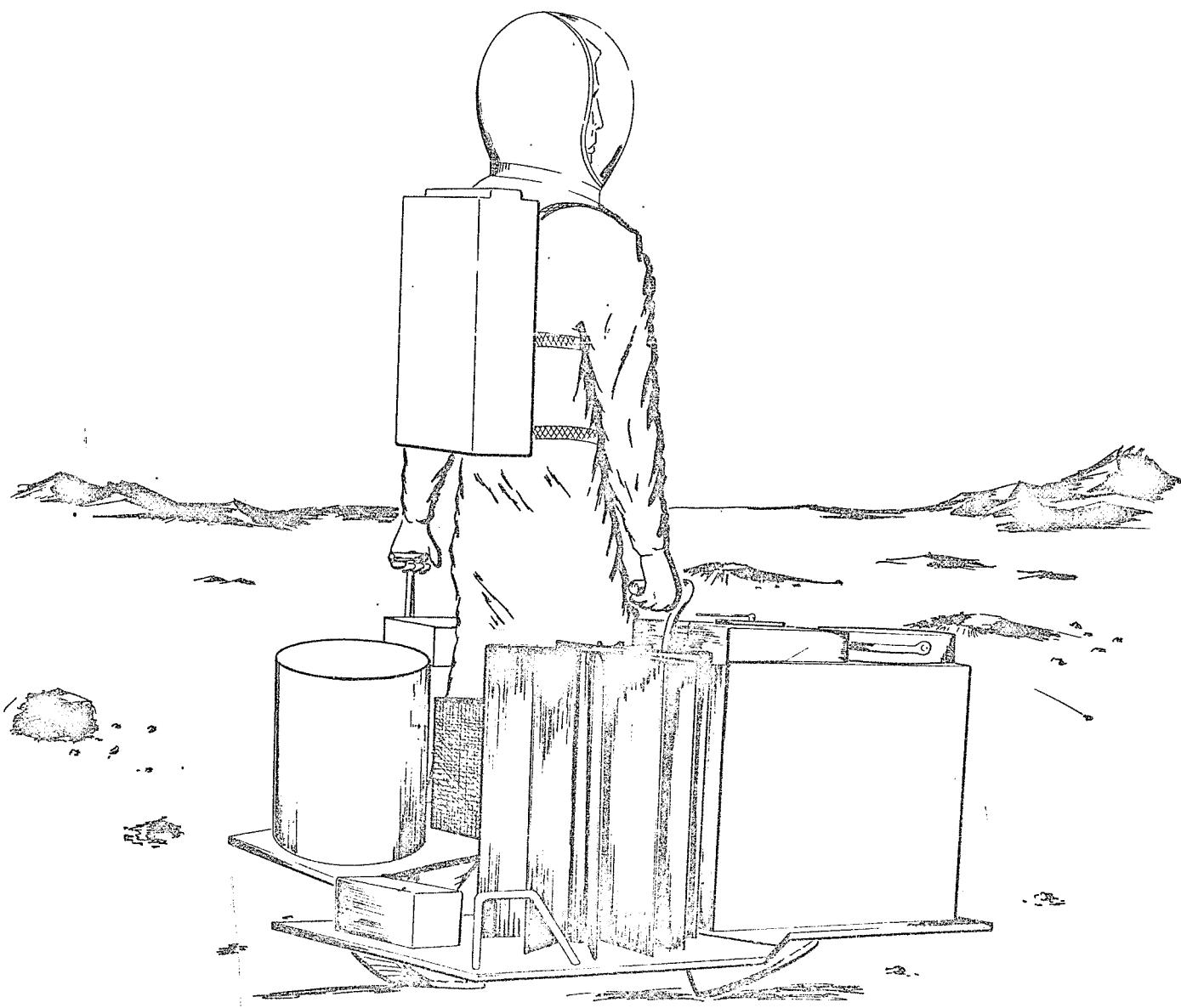
INSTRUMENT PACKAGE



09/437

Fig. II Bl2

ALSEP CARRIED CONFIGURATION

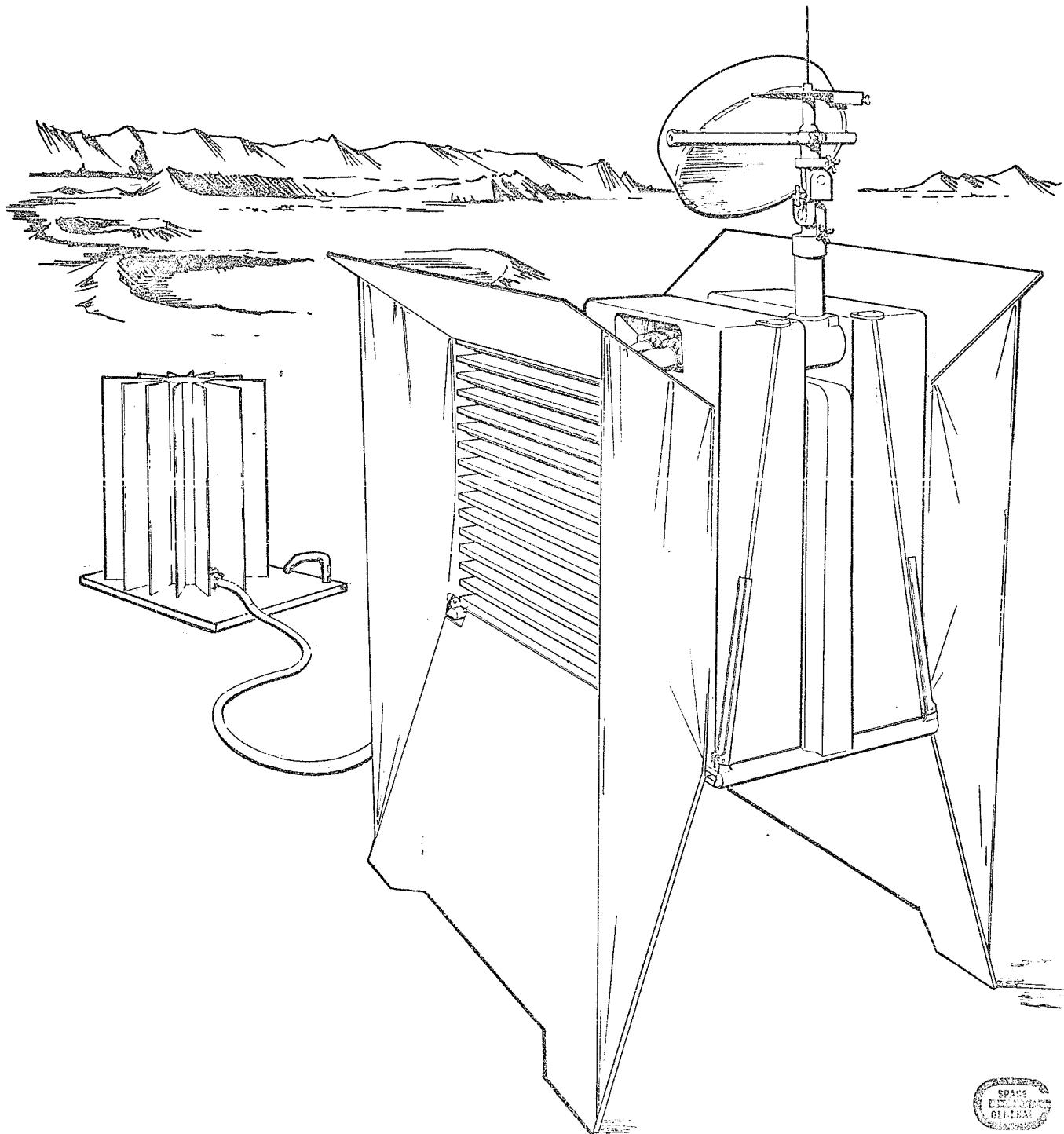


SPACE
LAYOUTS
GENERAL

09/448

Fig. II-B13

CENTRAL PACKAGE, EMPLACED

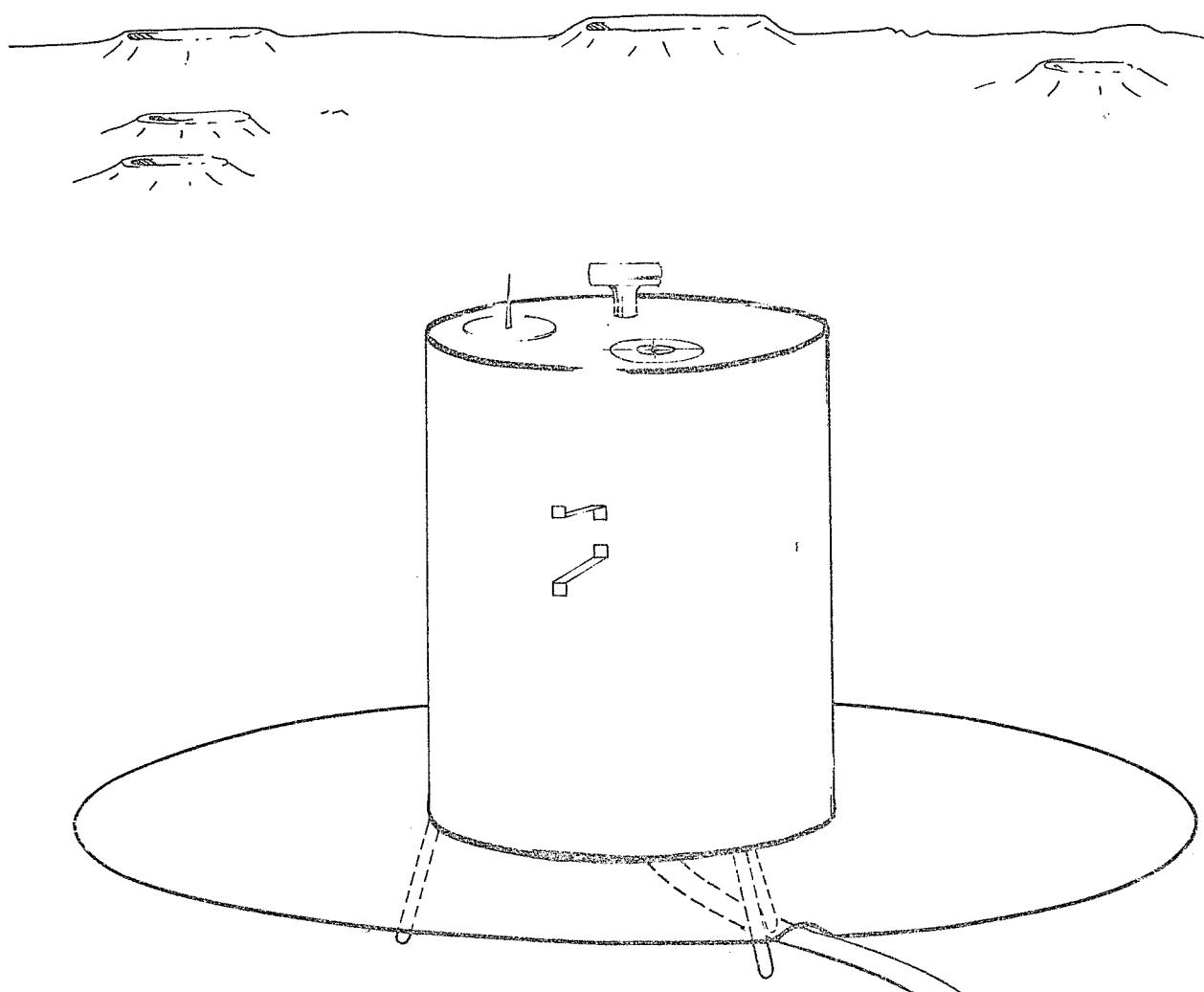


SPACE
EQUIPMENT
DIVISION

09/452

Fig. II Bl 4

PASSIVE SEISMO METER

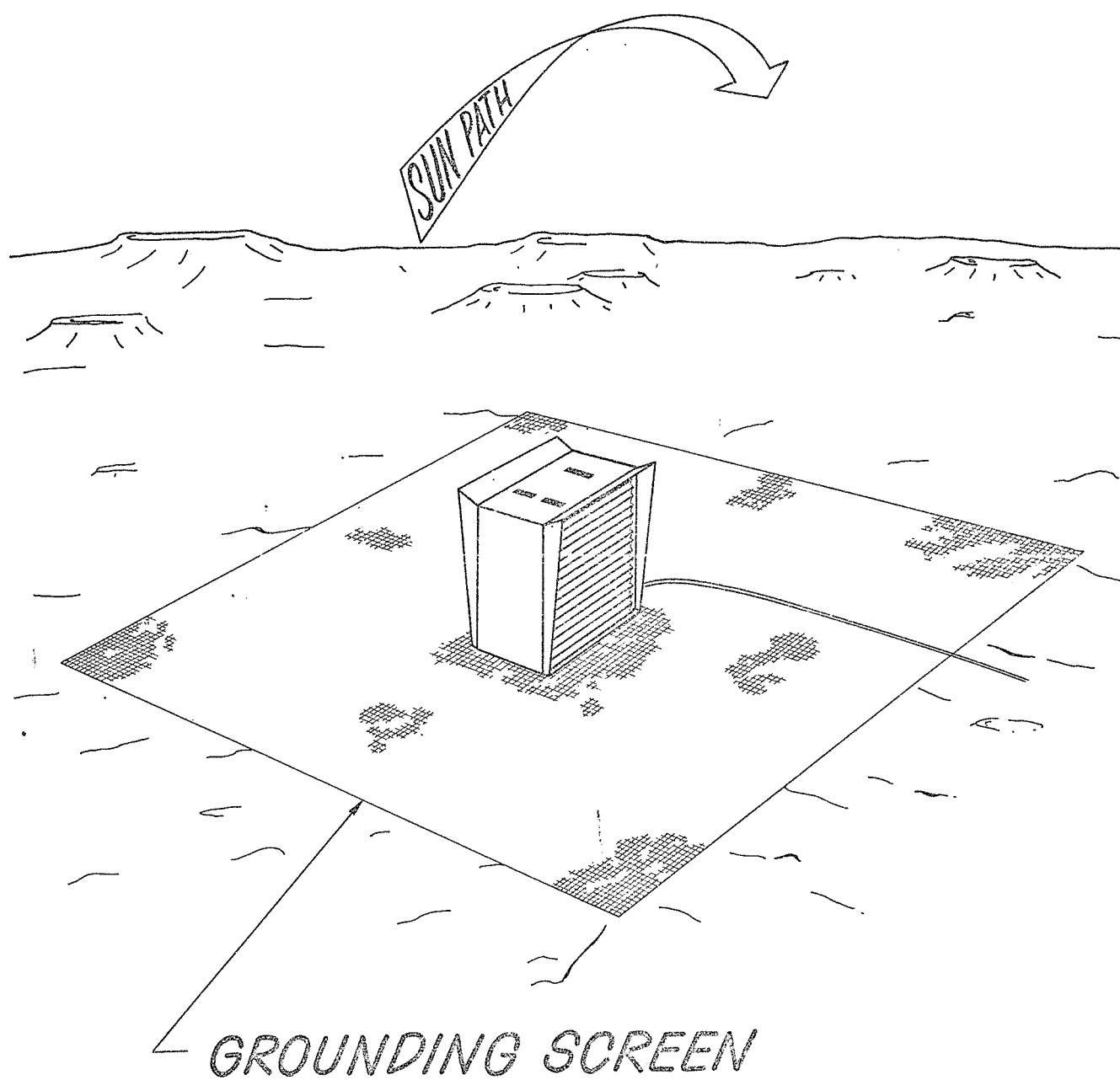


SPACE
TELECOM
GENERAL

09/445

Fig. IT-B15

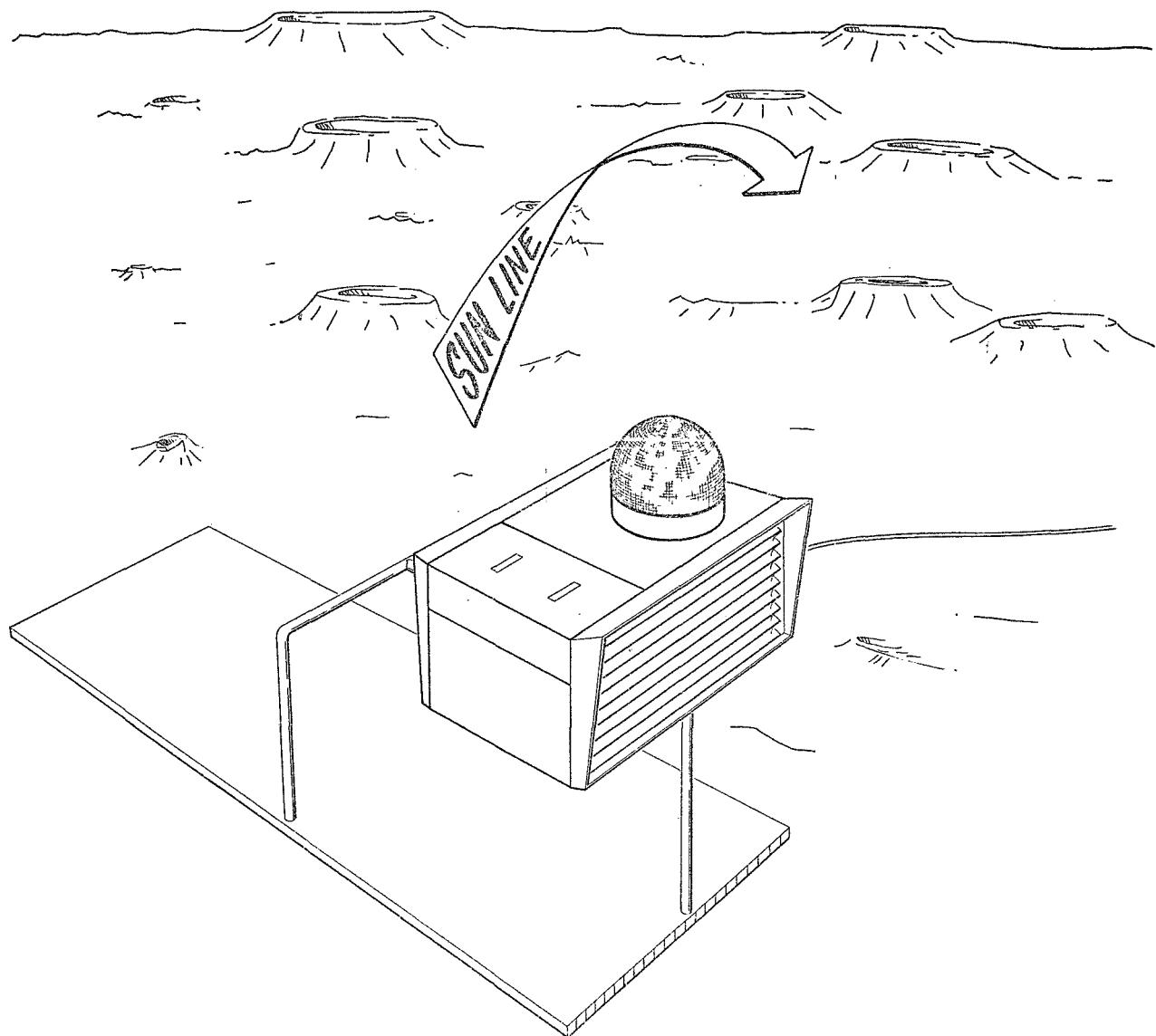
SUPRATHERMAL ION DETECTOR



09/447

Fig. II B16

PLASMA DETECTOR AND ELECTRON-PROTON SPECTROMETER

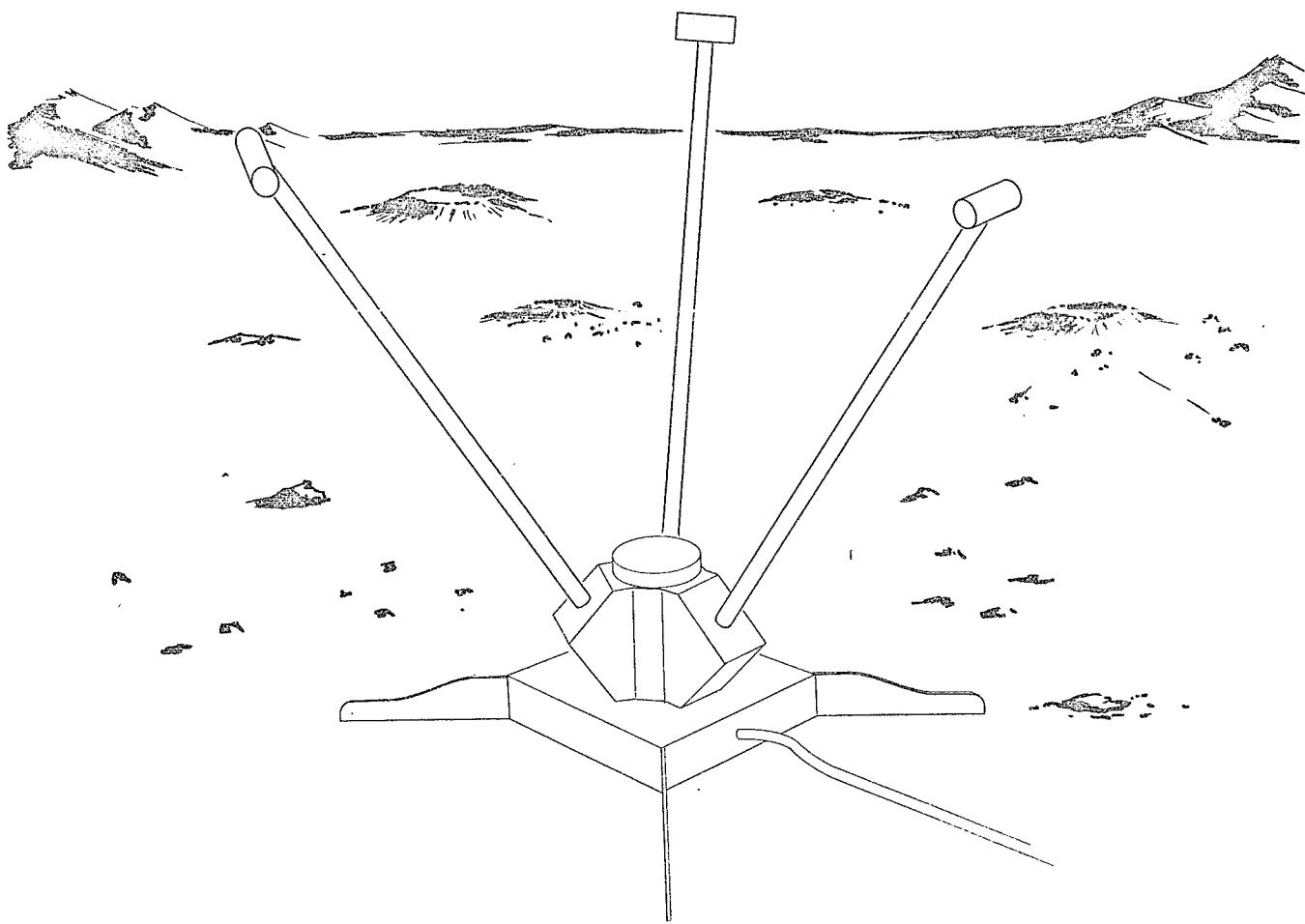


SPACE
TECHNICAL
CENTRAL

09/453

Fig. III-B17

FLUX GATE MAGNETOMETER

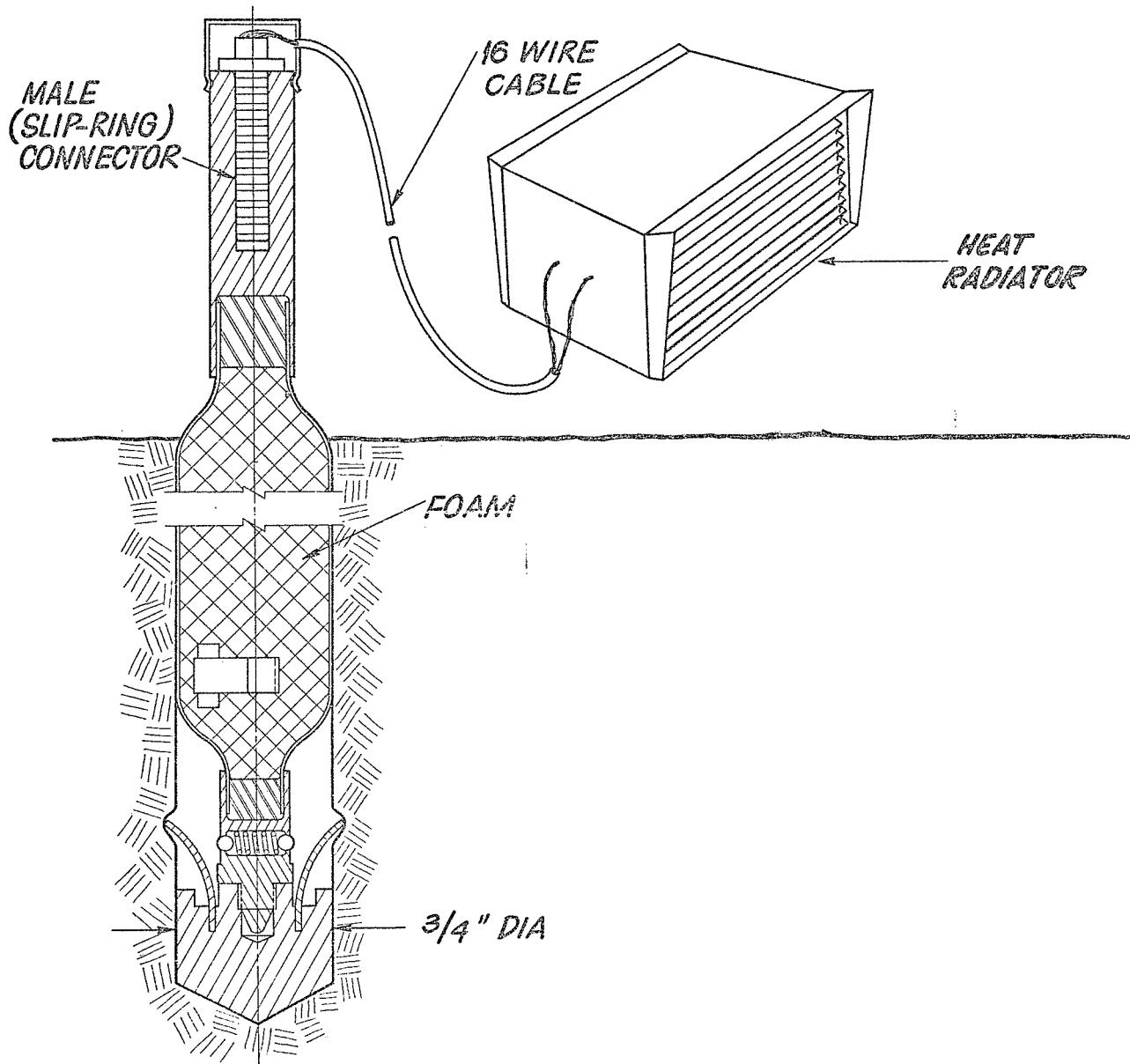


SPACE
TECHNOLOGY
GENERAL

09/444

Fig. III B18

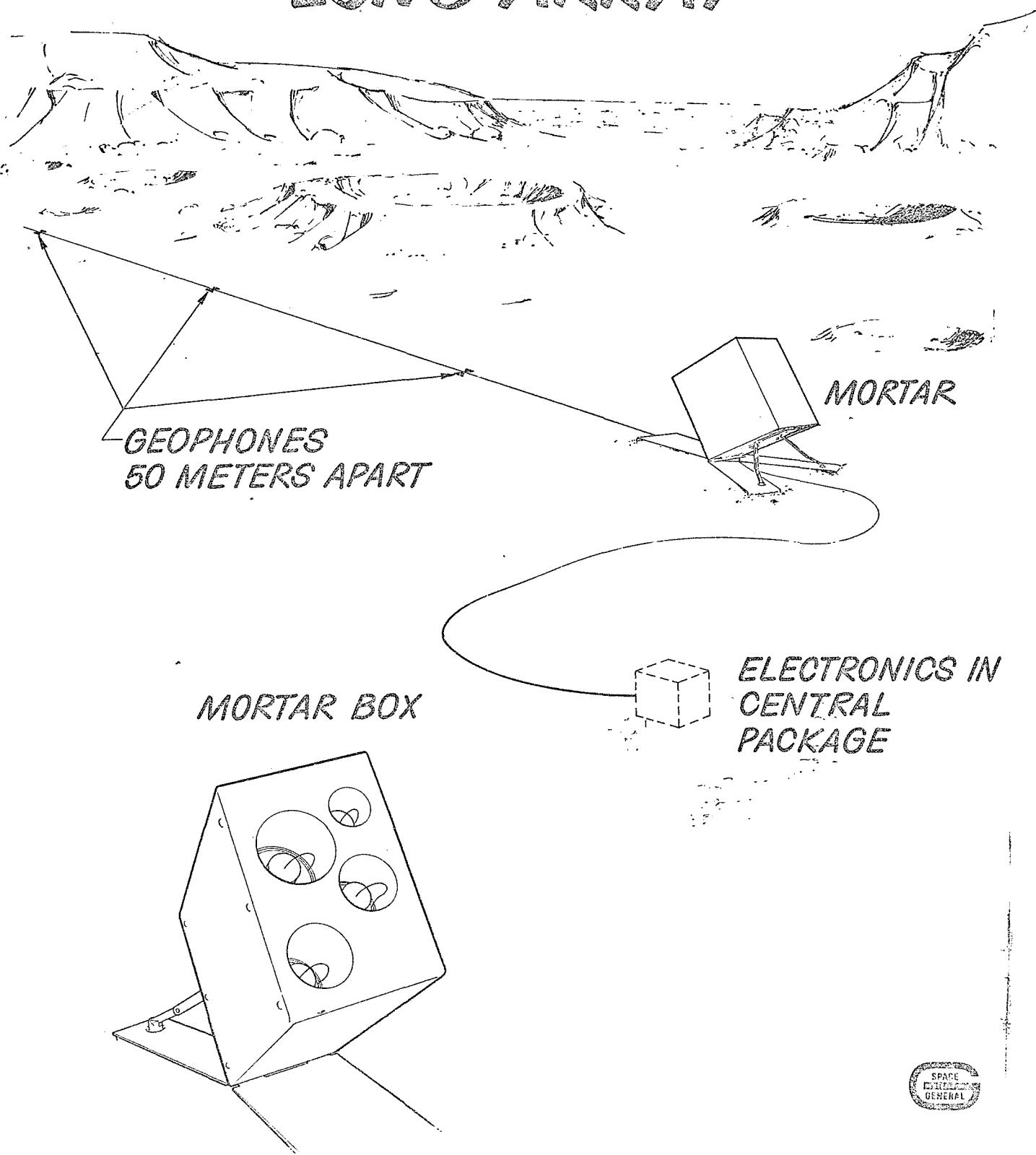
HEAT FLOW SENSOR, EMPLACED



09/456

Fig. II B19

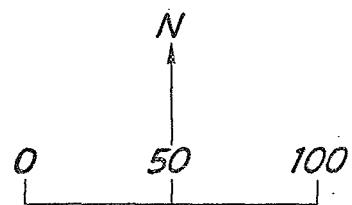
ACTIVE SEISMOMETER LONG ARRAY



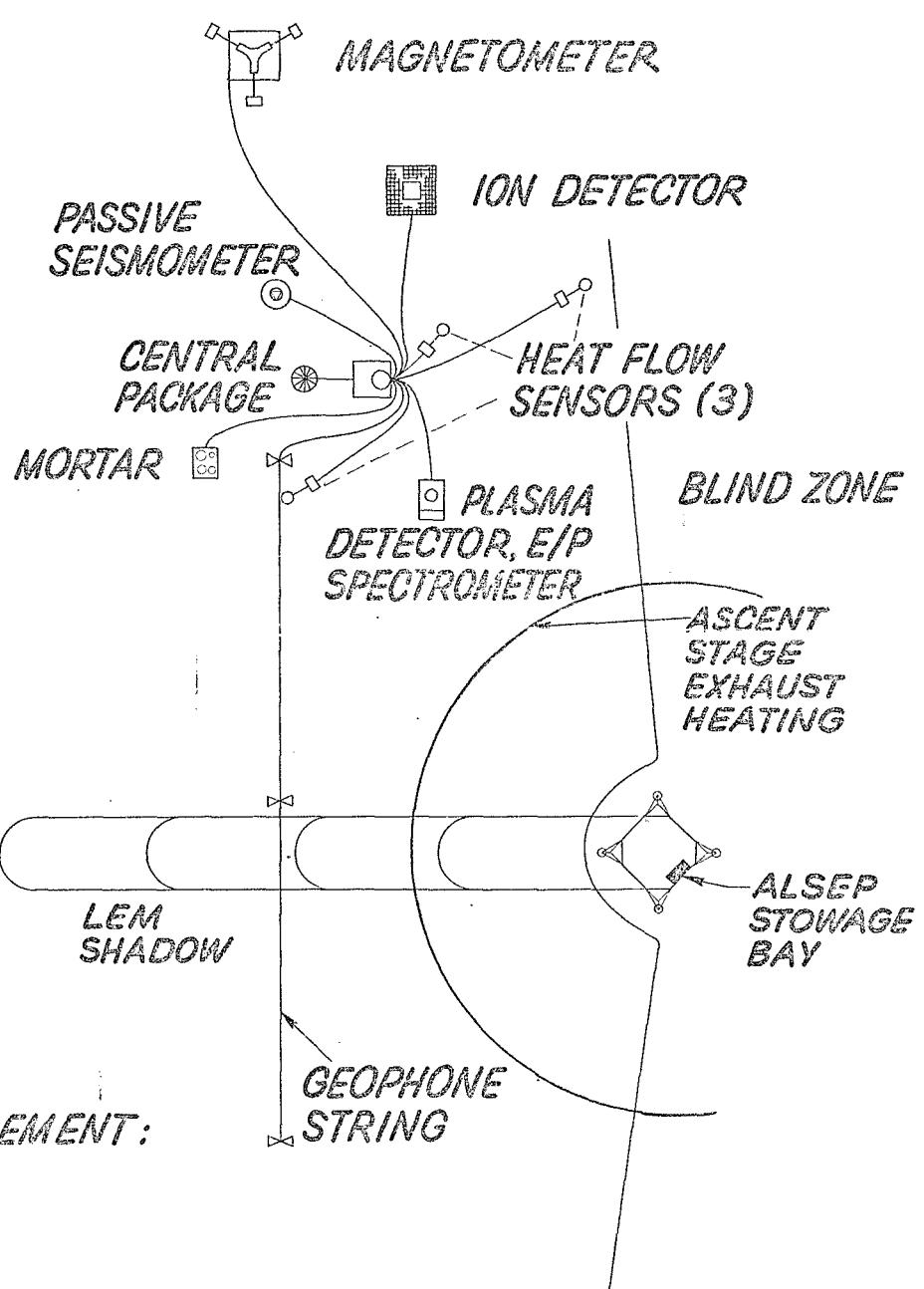
09/457

Fig. II B20

TYPICAL DEPLOYED ALSEP (WITH ALL EXPERIMENTS)



NOTE:
DISTANCES AND
LEM TO SCALE
PACKAGES OVERSIZED



EXPERIMENT COMPLEMENT:

- PASSIVE SEISMIC
- ACTIVE SEISMIC
- MAGNETIC FIELD
- SUPRATHERMAL ION -
- PLASMA
- ELECTRON PROTON
- HEAT FLOW

09/450



Fig. II B21

FBI - MEMPHIS

FD-302 (Rev. 1-25-64)

III. Attorneys

Dr. D. Gray, JDC
 Dr. Morris, JDC
 Mr. Koontz, AAG
 Dr. C. Schmit, AAG

P. Nichols, AGO
 W. Shadley, AGO
 R. Givens, AGO
 M. McRae, AGO
 P. Marshall, AGO
 S. Johnson, AGO

IV. Description

A. The Picard family home was in general good condition except profile developed. The garage door, originally mounted on SW, is too low.

B. The magnetometer compass readings were good along the lake changes slightly. No pattern in compassings is obvious.

C. The plowshare/garbage-truck operation was well maintained between the time controls of each activity. No control or break, any increase in activity after the 100 mts. of distance.

D. The magnetometer and video camera are to be weighed in Picard house during the 100 mts. of distance from a base camp to a good reference point.

E. The data output from video camera was disturbed and the data plotted off-pulsebed.

F. Interference comes off the Central Heating and Air system by expansion to the refrigerator and air cooled.

G. The Picard home, garage, and property has been searched. Dr. Morris, AAG, Dr. C. Schmit, AAG, and Mr. Koontz, AAG, for document, evidence, items, etc., that might be used in a search of persons or places of interest to the case or inquiry.

VII. Action ItemsPriority

Established radio contact Picard home and via 100 mts. of distance work on law and order problems. This is to be done in conjunction with

H. The General Office of FBI on the staff office of a general.

I. The Picard

KO, AGO, AGO

J. To file copy of

CONFIDENTIAL

KALIBRUM INSTRUMENTATION

22 January 1966

I. Attendees

Lamont Geophysical Observatory

SAC

Dr. G. Sutton
S. Thanos
W. McDonald

J. W. Major
M. Shantz
G. Ford
M. Horley
H. Farnlo

MEP

Dr. F. Press

NASA

Talbottne Corporation

Mr. Lorya (AF)

Dr. J. Blodsoe
W. Rihm
L. Berkovitz
R. Smith
D. K. Kovallis

II. Discussion

A. Review of Functional Specification

Comments:

1. Specific damping to be of critical to critical.
2. Dynamic range to be 80 db on oil channels. Acceptable alternative involving gain change per decade - d.
3. Spec should include statement on accuracy of calibration.
4. Desirability of accurate unitary scaling indicated.
5. Advantage of test connector discussed.
6. SDO will require transverse magnetic field to be uniform or will be exponentially decreasing ignored.
7. Sheet metal instruments should be considered judiciously (from reliability standpoint) from all other aspects by end user. SDO will consider feasibility and advantages of various methods of construction in producibility of sheet metal instruments.

PASSIVE SURFACE MEASUREMENT (CONT'D)

B. Review of Passive Surface Measurement Interface Specification - preliminary draft without figure 1.

1. Discussion of factors affecting weight reduction to 18 lb. design goal. Estimate approximately how attributable to change from aluminum to beryllium. Dr. Austin points out that the experience allotment for this instrument is 25 lb.

2. Discussed P. Doherty proposed "calibrating requirements." Additional translational flexibility indicated.

3. Separate calibrate command for each axis not required. One command acceptable (first application, start calibrate; second application, stop calibrate).

C. Thermal Control

1. Description of thermal control ranges. Total range of 0 to 30° C not acceptable. Required that calibration temperature not be within tolerance with sunn which is 0 to 300° C range. Difference of differences between 140° and 50° degrees unacceptable with reference to great concern. It is desired that instrument temperature can be made uniform as possible in both form and character. If any adjustment will affect the Seismometer Report thermal analysis.

D. Reviewed Trace FC Readiness/Env. vibration relationships.

E. Coarse Level

Principial three digit coarse adjustments against fixed stops. Obj. for coarse switch provision flat stops. Main coarse switch acceptable. Execution of adjustment stops also recommended.

III. Requirements transmitted

A. Transcribed copy of AL-P-3049 dated 7 January 1966, "Requirements Specification for Data Handling, Data Control and Electrical Power," to JSC.

B. Transcribed copy of document "EOT supported life of 60 LRU's" dated 10 January 1966.

TELE

MEETING OF THE DESIGN TEAM

12 January 1986

V. Attendees

Telecopy

R. L. Kovach
J. S. Watkins
F. Kruse
T. G. Michel
J. D. Endsoe

SAC

C. P. Ford
B. Fathauer
E. Wrigley
R. Froehlich

AAC Person

James Goetz

VI. Discussion

- A. The chamber requires a capability of 20 inches, not 24.
- B. The mortar requires only four (4) projectiles; the 300 foot range is not required.
- C. A proposal from Interface shall be obtained in regard to geophones.
- D. E.W. stated that 10,000 fathoms are acceptable.
- E. The geophone cable is to be color coded.
- F. SAC will evaluate geophones for system requirement, environmental and manmade weights to meet these requirements.

VII. Action Items

S-1-12-15

NASA will let SSI know whether 10,000 fathoms geophone cable is acceptable for AAC-1 - 2 February 1986.

S-1-12-16

SAC to furnish proposal within 10 days capability of 20 inch bond range. Present acceptable range is 10 inches (10 inches into test straitline). Due 19 January 1986 via electronic mail or followed by letter.

TECHNICAL REVIEW MEETING

12 January 1966

I. Attendees

Rice University

B. O'Brien
F. Abney

SAC

J. B. Malenka
E. R. Lewis

II. Discussion

A. Experimental objectives were reviewed and remain as quoted in Dr. O'Brien's proposal to NASA. Discussion stated that if the earth look angle is considered alone, about 70% of expansion is achieved. If look face angles are used, 75% of objectives can be achieved after a month.

B. APC proposal was discussed. Rice has a solid state high voltage power supply system currently. Several design changes are required to make the proposed component fit SAC. A single unit weighs 1.5 lbs.

C. Thermal control concern for expansion. No effort given to fine grating technology with current Director.

D. Communications and interface requirements. Rice and ATG were discussed.

E. SDC and navigation applications were discussed. In. Optics required vent for thermal was cause for fail.

F. System testing will require, as a minimum, the use of a data source to verify that a single channel is operating. Next level would involve flooding tank UV and finally a fixed level would require measuring all voltages.

G. SDC operationalization was reviewed and improved with minor changes.

III. Action Items

SAC-12-21

SAC will place a call for bid on the Rice University, the first experimental flight vehicle, consisting of the expansion chamber and of the SDC, APC and CDR equipment. The contract will be awarded to the firm having the lowest bid.

SAC-12-22

A. SAC will furnish a memo to the Director of SAC

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DEPARTMENT OF RIVER MANAGEMENT, STATE OF KARNATAKA

12 January 1966

1. Attendees

Rice University

228

R. O'Brien
W. Blaney

T. E. Valente
R. Sevin

II. Preparation

- A. Experimental objectives were reviewed and remain as quoted in Dr. O'Brien's proposal to NASA. Discussion showed that if the earth lock angle is considered alone, about 70% of experiments are achieved. If total lock angles are used, 75% of objectives are achieved after a month.

B. ADC proposal was discussed. Rice has a solid state high voltage power supply design currently. Several designs are proposed to make the instrument compatible with flight. A single unit weighs 1.5 lbs.

C. Thermal control concepts for experiments. No objection to intergrating thermally with the sunshades.

D. Communications and interfaces concerning SGD, Rice and ADC were discussed.

E. SGD and Interrogation recommendations were discussed. Dr. O'Brien requested that the standard test data be F1.

F. System testing will require, as a minimum, the use of a local source to verify that a single element is operating. Next level would involve flooding with UV and finally a third level would involve measuring all voltages.

G. SGD classification was visited and discussed with minor changes.

1000. 2010. 10. 20

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Each child receives a full-time educational program that emphasizes the individual development of each child. The emphasis is on the education of the individual child, his strengths, his interests, his needs, and his potentialities.

5. *Leucosia* *leucostoma* *leucostoma* *leucostoma* *leucostoma*

3. *Georgian* *Archaeology* 1983, 27, 223-230. *Archaeological Survey of Georgia*, Tbilisi.

He was a man of great energy and determination, and his efforts were instrumental in the success of the project.

SUPPLEMENTAL FOR LEMMING MEETING

10 January 1966

I. Attendees

Rice University

J. Freeman
W. Smith

Lamont Geophysical Lab

M. Tangestani

SGC

A. Givrin
J. B. Wilkinson
K. Schwartz
R. Cromleigh
B. D. Swirsky
H. W. Thorleifson
A. Morrison

II. Discussion

A. It was established that transducer coupling may be required by the buoyancy ion detector. This should be given further consideration. This may be marginal because of a easily developed device to change the transducer interface which is subject to local growth. This should receive further study.

B. Dr. Freeman expressed the desire to increase the number of counts to something of the order of 100. It was recommended that this number could be reduced by some changes within the instrument. Dr. Freeman stated that he thought it was his responsibility to resolve the question and design his detector at no time with one expected 32 sec time constant and constant voltage. It was resolved that after he has decided on specific constants and procedures a meeting between Mr. Peterson and Dr. Cromleigh should be arranged through SGC.

C. Dr. Freeman expressed the wish to raise his available data rate from 64 to 68 bps - SGC agreed that this seems sensible.

D. A rock code in S-7 form which would be desirable (generated with in the central package).

E. Provision should be made for calibration, leveling and orientation of the box.

F. The flight instrument should have two switches on the top of the box. These should be in such a position that one switch is a key switch and the other an all or none switch for the three channels.

SUPRATHRESHOLD TOP DIFFUSION WEDGE (Continued)

- 6. The top of the box shell be a metal surface, tied to electronics ground.
- 7. Consideration should be given to examining some thermistor measurements of the ground grid temperature in support of the Hot Flow Experiment.
- 8. Dr. Freeman thinks that switch-on surges may exceed 200% of steady conditions. This should receive further study.
- 9. 14 volts power is agreeable to Rice if use of this is so decided by HSI.

III. Proposals Presented

- A. Two OR documents (HL-P-3029 and HL-P-3031) have been given to Rice personnel and nose; an ILC and HSI Team participation; and access on command, control and data readout interfaces between the exp. and the C.P.

ALL-F

ALASKA RIVER FLOW LOGGING LINE MEETING

12 January 1966

I. Attendees

Dr. Marcus Langseth, Lamont Geophysical Laboratories
Dr. Gene Simmons, MIT
Dr. Paul Nickson, Bellcomm
E. Davin, NASA Headquarters
C. D. Little, EOC
R. Froehlich, EOC

II. Discussion

A. Dr. Langseth discussed changing the direction of our effort from implementing his approach in terms of engineering and equivalent to one of participating with the principal investigator from the ground up to achieve the scientific objectives. This would start at the beginning of Phase II.

B. Space-General will need guidance from the principal investigator (referring to our above) from us, until the end of Phase I, in order that we may effectively apply our people to the proper approach.

C. A general discussion of the subsurface operation and design, along with a tour of the site and where various components will be concentrated.

D. Dr. Langseth suggested that Space-General begin a study of measuring conductivities by the transient tec. He stated that our present design of the probe could not measure conductivity. We must redesign it in order to provide a probe having a length-to-diameter ratio greater than 10.

E. It will be necessary that Space-General obtain a number of suitable precision thermal sensors and related equipment.

F. It was the conclusion of the group that the major problems encountered would be interface with the drill hole and the temperature probe, also calibration of the probe - more at various ground surface stages.

G. There was some discussion about the final form of the transducer case. The improvements suggested were to fit the probe into the center of the transducer frame.

ALSEP HEAT FLOW INSTRUMENT DRILLING (Continued)

III. Action Items

S-1-12-06

Space-General agreed to supply Dr. Langseth and Dr. Biszantz the deployment time of the heat flow experiment, not including drilling of the hole.

S-1-12-07

Space-General are requested to furnish to the ~~attendee~~ a list of senior staff scientists, areas of interest, and qualifications.

IV. Documents Required

A. Agenda

B. Investigator Responsibilities for Contractor Performance Requirements

C. SGC Responsibilities to Investigators

D. Schedule

E. Heat Flow Block Diagram

F. Technical Specifications

G. System Specification

H. Interface Control Document

I. Diagram of Heat Flow Sensor Deployment

J. Diagram of Deployed Heat Flow Experiment

K. Thermal Control system Test Report

L. ALSEP-12B, Reliability Information for Contract and Evaluation, Low-Level Qualification, Data for Review

M. ALSEP Operational Data and Control Log

N. Recovery and Recovery Site Data Sheet (including Diagram No. 12-12-03, dated 1 January 1980)

O. List of key personnel assigned to the Heat Flow Experiment (e.g., M. Johnson, G. Weller and J. Sherrill)

T-3
SYSTEM MEETING
12 January 1966

I. Attendees

NASA

D. G. Wiesman
P. Mulcahy

SGC

W. S. Pohlmeyer
G. V. Moulton
P. M. Rafferty

II. Discussion

A. Testimony

In general, the current SGC approach to testing is in agreement with the current recommendations made by NASA. One area of difference may be the degree of automation and interface for the system's checkout equipment. It would appear that NASA is defining the terms of a simpler protocol.

Another area of difference between the NASA recommendation and the current SGC plan is that the SGC recommendation requires two (2) qualification systems, and the SGC plan is for one (1) qualification system.

B. Hardware

The discussion of program hardware which is part of the general proceedings was discussed further with regard to the definition of hardware contained in the IBC-AIRB Equipment Provision and Test Philosophies document.

1. Separate qualification of the spare component for flight systems has provided evidence that one qualification of spares would be provided for each of the three (3) safety margins, i.e., unique spares for functions A and B. The spares will be delivered concurrent with the flight systems. This concept under the IBC-AIRB document would provide 100% spare spares. This is illustrated in Figure 2-10a previous planning.

2. The IBC-AIRB Equipment Provision and Test Philosophies document indicates a requirement for three (3) simulations for (1) overall/interactions, two (2) radiation, and (3) life cycle. In light of the current work described a recommendation for three (3) checkups, one (1) thermal simulation, and two (2) lifetime simulations. The two (2) lifetime tests are independent of the simulations. The qualification tests:

a. LSCM - Marshall Space Center will be charge of vibration testing and one (1) environmental simulation test will be conducted at Marshall Space Center. The other two (2) environmental simulation tests will be conducted at NASA Langley Research Center, Virginia.

b. T-3 - Marshall Space Center will be responsible for electrical testing and one (1) environmental simulation test will be conducted at NASA Langley Research Center. The other two (2) environmental simulation tests will be conducted at NASA Langley Research Center.

c. A thermal/mechanical simulator will be installed in LEM-3 for orbital flight as a flight test simulator.

d. One (1) mechanical simulator will be delivered to MSC for some simulation testing.

e. One (1) fit check (simulator) defined by SDC as interface tooling, will be utilized at Grumman for ALCM/ALM fit checks. SDC currently plans to provide two (2) sets of this tooling, one (1) set at El Monte and one (1) set at Grumman, New York, N. Y. A set of cooling exceptions three (3) items; one (1) for the cast mounting, one (1) for the central package, and (1) for the instrument package. SDC believes the total requirement can be met with one type of interface tooling. MSC thinks two items are required, one (1) simulator and (1) set of interface tooling.

3. MSC stated that ground support equipment was to be delivered and installed at the Launch site prior to receipt of the first flight system.

4. One (1) each precision GPS instrument will be provided for use in the SDC system-level qualification program. The GPS instruments, however, will be qualified by the GSE connection. For purposes of costing Phase II, it is to be assumed that GPS simulations will be made by SDC, that is, no GSE-supplied simulations.

5. MSC's recommendation is for the (2) sets of system test equipment which will require three (3) sets of GSE per MSC's current definition of analytical requirements when to each one (1) set of systems test equipment is required to be acquired at El Monte for factory checkout. These (3) sets will be required for purposes of the Phase II costing.

XII. Proprietary Requirements

A. To SDC - "ALCM Test Equipment and Test Philosophies" (one copy)

This document defines the principal program hardware and space requirements and in addition, indicates the test philosophy for development, qualification, acceptance and field tests. The document is to be used as a guide for costing Phase IX and the completion of the Phase I plan.

B. To MSC - "ALCM Verification/Qualification Test Summary", dated 11 January 1963.

This document discusses the current GSE approach to design verification and qualification of the ALCM system. This document provides to the SDC the information necessary to allow them to build upon the basic concepts outlined in this plan by using a similar approach for the ALCM system and in defining requirements for the qualification and evaluation strategy of the ALCM system from the point of view of hardware use, (Phase II).

ALSEP EQUIPMENT REQUIREMENT AND TEST
TERMINOLOGY

There is a multitude of equipment that could logically be rationalized for use in the ALSEP program. However, the program costs and schedule present a very concrete limit for hardware generation and usage. In this sense Table 1 lists equipment to be provided for all uses in the total program. Definition of Table 1 terminology follows:

- a. Production, flight: Fully type qualified and acceptance tested ALSEP systems.
- b. Production, Qualification: A complete final production model ALSEP system not yet type qualified.
- c. Production, Spare: Fully type qualified and acceptance tested compliment of ALSEP replaceable components.
- d. Simulator, Thermal/Mechanical: A complete simulation of the ALSEP system package configuration in physical characteristics. Thermal vacuum testing will be performed in EVA-3.
- e. Simulator, Mechanical: A complete mechanical simulation of the ALSEP system package configuration including weight-center of gravity, structural simulation etc. This model will be vibration tested in EVA-3.
- f. Simulator, Structure: A simulation of the ALSEP system package configuration to be used by GAMI for "fit checks."
- g. Prototypes: An ALSEP system physically and electrically like the final production model. Details of parts used may not be as the final production version (e.g., high reliability resistors).
- h. Spares: An ALSEP required initially for the final production cycle or for early return to Earth orbits. The details of this

model are left to the contractors discretion. However, production likeliness must be maintained to the degree that useful electrical integration and electro-magnetic interference tests can be accomplished.

- i. Mechanical Mockup: An ASES system nearly like the production ALSEP in all mechanical aspects. This model is to be used to accomplish the mechanical integration of the ALSEP and to establish the feasibility of mechanical design.
- j. Breadboard/Brassboard: This model of equipment will be generated and used as an engineering tool only to allow proper equipment design. It may or may not configure the final ALSEP production equipment.

Table I

<u>Model</u>	<u>User</u>	<u>Quantity</u>
Production	Flight 1, 2, 3	3
Production	Flight Backup	1
Production	Spare 1, 2	2
Production	Qualification 1, 2	2
Simulators	Thermal/Mechanical UTA-8, TEP-3	2
Simulators	Mechanical UTA-3, NSC Simulation	2
Simulators	Structural GEM Fit Check	1
Prototype	Development Tests	1
Engineering Model	Development Tests	1
Breadboard/Brassboard	Feasibility Tests	1
Mechanical Dc	Feasibility Tests	1
System Model Manageric	Qualification, Acceptance and Field Planning	

Part II Interface Coding - Interface Definitions

The Apollo Lunar Surface Experiment Package (ALSEP) including the assigned compliment of lunar surface experiments must operate for an extended period of time on the lunar surface. To gain confidence in the ability of ALSEP to achieve this requirement a logical, closely monitored test program for ALSEP is essential. In general, the test program can be thought of in six categories.

a. Feasibility tests

These tests are performed on very early breadboard and brass-board engineering models of equipment. Success of these tests provide confidence in the design approach.

b. Development tests

Development tests are performed on equipment of a generation having characteristics of the proposed final production hardware. Tests of this type will add additional confidence for electronic design, development verification, and will provide assurance that full operational and environmental testing can be successfully accomplished.

c. Qualification tests

A series of formal tests will be performed on the first production equipment. These tests will subject the equipment to operational and environmental conditions to provide assurance that the design, development, and production have in fact resulted in a usable product meeting the stated primary requirements. Prior to submission to qualification tests, successful completion of acceptance tests must be confirmed. Upon successful completion of qualification tests, and after the equipment has been considered by NASA and the prime contractor to be fully qualified, qualification will be terminated.

d. Acceptance tests

Acceptance tests will be performed on each production and simulator item of hardware. The purpose of these tests is to prove the individual operational capability of the item.

e. Field tests

Field tests will be performed on the ALSEP flight systems and spare equipments in support of the launch area operation. These tests will functionally verify the ALSEP operation to allow further confidence in the particular system and its operational characteristics prior to Apollo Launch. In addition, tests will be performed in the case of system malfunction to isolate the replaceable failed component and to reverify the system's operation upon replacement with a spare unit.

f. Lunar surface verification tests

It may be desirable to examine the ALSEP after deployment on the lunar surface to ensure proper operation. Tests of this type are expected to be functional in nature and closely related to equipment design and astronaut capability.

Where possible, monitoring of equipment performance during testing is desired. It is obvious that a definition must be made of the style and quantity of equipment to be used in each testing category and the primary test objectives to be accomplished. Table 2 summarizes the test program.

Table 2

Test Items

Question

Testives

Design Consistency	Scramboard Lanthanical Rock Up	1 1	No establish feasibility of the design approach; to verify equipment operation in critical design areas; to provide an engineering tool for design verification.
Design Verification	Prototyp Engineering Model (Basic Design)	1 1	No prove manufacturing techniques; to provide additional confidence in design; to establish a basis for formal qualification tests; to establish and confirm equipment interface specification.
Manufacturing	Production	2	No conform ALSEP operation in the following categories: (a) Design limit conditions, (b) Standard mission, (c) off limit conditions, (d) Length of operating life.
Acceptance	Production Start Calibrators Thermal/Vac. Mechanical Func Check	4 2 2 2 2	No ensure that the equipment performance is in agreement with the subsequent functional requirements.
Production	Production Spares As Received	4	No ensure pre-flight readiness of equipment; to isolate and diagnose significant failure to the component level; to verify proper system operation subsequent to component replacement.
Final Acceptance	Production	4	No ensure proper ALSEP function subsequent to deployment.

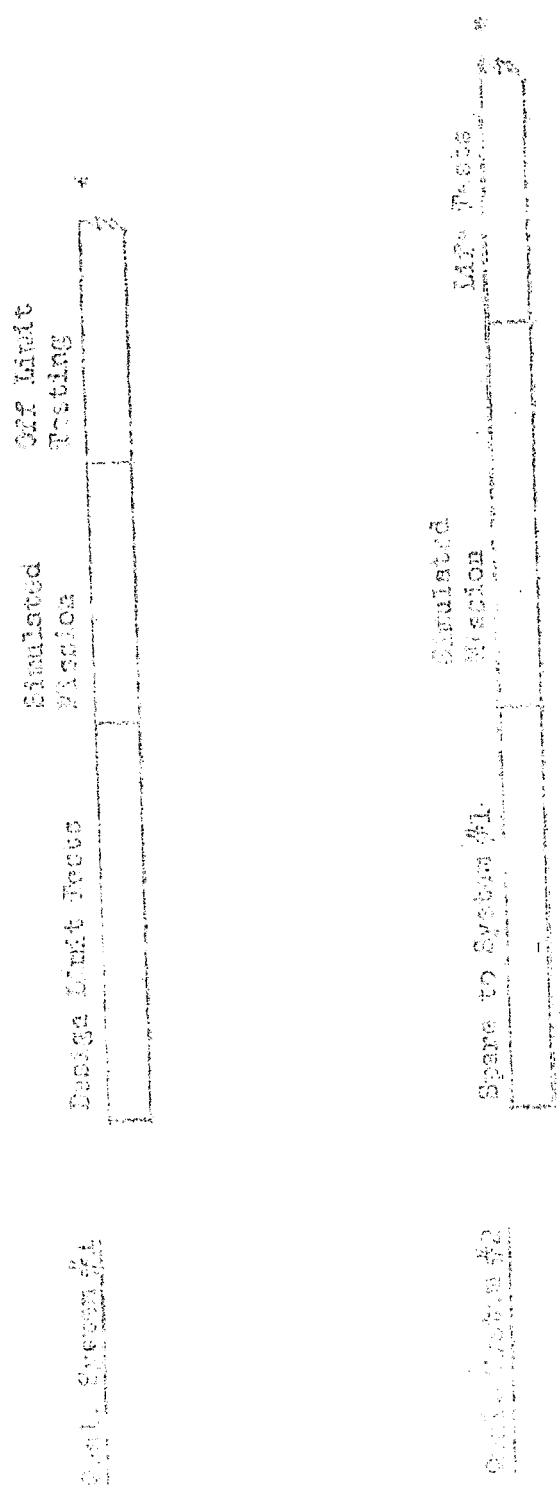
Particular attention is required for the Qualification Test Program (QTP).

In the QTP, confidence must be established in the ALSEP capabilities including various Government Furnished Equipment (GFE) experiments. In addition, identification of failure levels and failure modes is extremely desirable. It is obvious that reliability proof is impossible in the existing ALSEP program for schedule and cost reasons. Therefore, maximum confidence for equipment operation must be gained within the reality of program constraints. To achieve this purpose a QTP outline is provided in Figure 1. Definition of Figure 1 terminology follows:

- a. Qualification System: A full complement of ALSEP production equipment built with production tooling.
- b. Design Limit Tests: Tests which subject the passive and active ALSEP to the repetitive environmental and operational design levels. Combinations of environments and operating parameters may also be verified.
- c. Simulated Mission: A complete factory through end use cycle for equipment to include: (1) factory acceptance tests, (2) ground handling, (3) preflight tests, (4) package for mission, (5) Apollo simulated transportation environment, (6) simulated lunar operation. Total lunar operation will require accelerated life conditions.
- d. Off Limit Testing: Testing of equipment in discrete environmental and operational steps to 300% above the equipment design limit. This test gives insight into the more critical failure possibilities.
- e. Life Testing: Extended operation under design environmental and operational limits. This testing provides insight into equipment approaching life and failure values. Testing to be performed for a specified but greater time duration.

7

Quelques aspects de la psychologie



Qualification will be achieved at one equipment level only. All Government Furnished Equipment (GFE) will be qualified and accepted prior to use by the ALSEP contractor. Models will be furnished for incorporation into system qualification only. If a lower level of equipment is chosen for qualification by the ALSEP contractor, no GFE will be provided for this purpose. Additionally, there are planned two arrays of experiments, therefore any system changes necessary to accommodate the differences must receive qualification testing.

In order to accomplish the required testing of ALSEP in its several development and use phases, appropriate test equipment is required. It is intended that test equipment required for ALSEP testing in all phases take maximum advantage of available commercial testing devices cascaded where necessary into a suitable standard configuration. In this sense, advantage can be taken of the contractor's capital laboratory equipments in the early phases of ALSEP testing. It is not intended that elaborate fully automated testing of ALSEP be performed in any testing activity. A listing of test phases and associated test equipments is shown in Table 3. A definition of the test equipment follows:

- a. Laboratory: Individual commercial test equipments used in unique testing arrangements to provide engineering test data.
- b. System Test Equipment: A configuration of commercial test equipments cascaded in standard commercial racks with fabricated control and interconnection panels.

System test equipment interfaces will be efficient design and construction.

Table 3.

TEST EQUIPMENT UTILIZATION

Test	Test Equipment
Design Feasibility	Laboratory
Development	Laboratory
Qualification	Laboratory plus System Test Equipment
Acceptance	System Test Equipment
Field	System Test Equipment

NOTES:

1. No. indicates sequence of test.
2. *GFE items to be qualified by GFE contractors to environments specified herein.
3. **Test conducted after environmental test where applicable.

Equipment	Acceptance	Vibration - Descent Phase	Performance	Shock - Pre-Launch Phase	Acceleration - Launch Phase	Acoustics	Electromagnetic Interference	Tang. Cycle	Low Pressure - Solar Radiation	Thermal Model	Magnetic Mapping	Comb. Lunar Environ. - High Temp	Comb. - Temp. + Solar Radiation	Comb. Lunar Environ. - Low Temp
Passive Seismometer	1	2	**	4	6	8	10							
Active Seismometer	1	2	**	4	6	8	10					11	12	
*Plasma Detector	1	2	**	4	6	8	10					11	12	
Heat Flow	1	2	**	4	6	8	10					11	12	
*Magnetometer	1	2	**	4	6	8	10					11	12	
*Suprathermal Ion Detector	1	2	**	4	6	8	10					11	12	
Electron/Proton Spectrometer	1	2	**	4	6	8	10					11	12	
Data Processor	1	2	**	4	6			8						
Power Distribution Unit	1	2	**	4	6			8						
Transmitter	1	2	**	4	6			8						
Receiver	1	2	**	4	6			8						
*Power Conversion Unit	1	2	**	4	6			8						
*RTG	1	2	**	4	6	8		10						
Deployer	1	2	**	4	6			8						
Antenna	1	2	**	4	6			8						
Equipment Housing	1	2	**	4	6	8						10		
Shipping Container - Design Verification Test	1	2	**	4	6	8								
Prototype System -	1	2	**	5	8	10	14					13	14	

**EDUCATION/QUALIFICATION
SUMMARY**

TESTS

MEMO

STRUCTURAL/MECHANICAL VENTURES

12 January 1966

I. Abendroh

MEX

SAC

R. Morris

R. A. Morris

II. Discussion

A. A brief review was made of the changes in structure which were born made since the last meeting. The changes are all minor and require no action.

B. The thermal design was related to the developmental testing in process at SAC, including the hydrogen storage, conductor cooling, separation and heating modes were discussed.

C. The structural design was reviewed to show that one being proposed at MDC involving the addition of a top plate, separation shield and heat sinks.

D. Heating design details were reviewed including the heating load, structural design and the thermal interface between the insulation and conductor insulation.

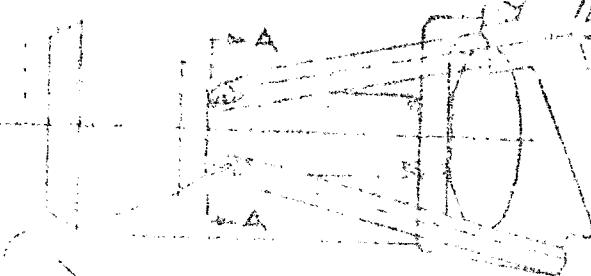
E. The plan of actions will include stabilizing the new heat sink rods will be forwarded to the manager. Future steps for extensive design. Scouring of these rods is still planned for the T-12 inservice change over.

F. The heat rejection needs determined by radiation waste were reviewed and the letter format was submitted.

G. The heat sinks, mounting legs, topplate, and heat mounting hardware were dimensioned. The craft and mounting structure and source and source profile are now included in one of the three F-mechs currently in use. In addition, the SAC sketch of the new craft was for a final design review was given to Morris for his review. This will be carried forward as soon as feasible to enhance future success.

SCIENTIFIC EQUIPMENT BAY
LOWER DECK

IFIC EQUIPMENT
CONTAINER
STOW LINE



-Y 27.00 (REF)

GEAR (250)

-Z 81.00 (REF)

SUPPORT

-X 152.840 (REF)

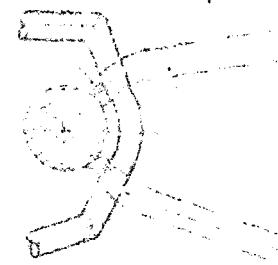
TRACE OF
-Z 81.00 (REF)

-X 131.225 (REF)

LEMI
COMPARTMENT
FLG 26

Fig. H.1

CASK MOUNTING ARRANGEMENT



SECTION A-A

(A)

RMT POLYMER MEETING

12 January 1966

I. AttendeesMSO

W. Zeebke

SOCA. Clavin
G. Curr
H. VaneiII. Discussion

A. A general discussion of the documents listed in section III of these minutes took place. Action items as listed in section II resulted. No significant conclusions were established.

B. Attendees discussed the analysis being performed on the effect of loop burn-off on spike LTO deactivation conditions. Attendees observed a deactivation of spike LTO deactivation in a laboratory.

III. Documents Disseminated

A. Memo - Data Subsystem Characteristics (Rev. 00)	10 January 1966
B. Electronic Packaging Concepts	11 January 1966
C. Average Density of Transistorized Logic	No Date
D. Active Semiconductor Component Interface (Memorandum)	No Date
E. Phenomenon-Mechanism - Mechanical Protection (Section 3.3-1-3 of Nomenclature Document)	12 January 1966
F. Ground-Breaking Mechanism (Section 3.3-2-1 of Nomenclature Document)	12 January 1966
G. ALSEP Return Flight (Engineering Notebooks)	12 January 1966
H. Design of 12" Circular Antennae (MS-1-1000)	13 January 1966
I. Replexer (Section 3-2-5 of the Engineering Notebooks)	13 January 1966
J. Scientific Instruments Power Control and Electrical Power Requirements (MS-1-1000)	13 January 1966
K. All of System Block Diagrams + Job Log	14 January 1966

DATA SUBSYSTEM TESTING (Continued)

IV. Action Items

S-1-12-02

SCC will answer the questions on the referenced AEC letter regarding RIG measurements no later than 15 January 1966. The answer will be telecon to Mr. Grayson or Mr. Clegg to be followed by a letter.

S-1-12-03

SCC will supply a functional description of the Data Processor operation written from the system block diagram standpoint to be sent by 26 January 1966.

S-1-12-04

SCC will send the analysis of the effect of phase lock loop degradation on error rate to MSC by 26 January 1966.

A.I.R.-J

FUSION FACTORS / SERIES

12 January 1966

I. Attendees

MCC

W. Cunningham, "Astronaut"
G. Stephenson
Dr. F. G. Israel (purist),
"Astronaut"

SGC

S. J. Crosby
H. Vinal
R. Ryding
J. R. Fryer

II. Discussion

A. Meeting was begun with a general description of ALSEP packages and deployment with emphasis on modifications since the December meeting, e.g., addition of thermal control surfaces, elimination of passive seismometer, change in connector surface between central package and lunar surface. (Charts used in General Experimenters Meeting show these points and are a part of the minutes of that meeting.)

B. The size, shape and mechanical design of handles and locking devices were then reviewed in considerable detail. Means of removing instruments from instrument canisters were discussed.

Removable shear pins held in place by ball-detents will be used to attach instruments to the carrying frame and to each handle.

In general, handles will be used first as locking devices and then inserted in packages and used for carrying. The same handle will be used more than once. A total of two such handles is planned so that loss of a handle will not prevent task execution.

C. Cable deployment devices were discussed and nozzles were shown of cable cans for use on the instruments and of the reel being investigated for deployment of the long graphite cable.

Mr. Cunningham expressed concern as to disconnecting the central package because of loads from the cables while being deployed.

D. Results of short-shear tests performed in SGC's simulator were reviewed—a written summary is attached to these minutes. A return to the Plan for pre-worked-out timing route to ALSEP on 5 January is being forwarded to MCC.

HUMAN FACTORS MEETING (Continued)

E. The training program was discussed briefly. Mr. Cunningham pointed out that KC-135 tests are expensive and that all such simulations must be performed with 1/6 weight equipment on the ground before being approved for in-flight testing. A revised schedule for the Training and Familiarization will be attached.

F. Requirements for lunar surface checklist by the astronaut were discussed. SDC's position is that no checklist is required or desirable. Discussion notes amplifying this position are attached. Mr. Cunningham and Dr. Michel, who joined the meeting prior to this discussion, suggested that the experimenters determine if the astronauts could contribute to improved results by such actions as *situ* calibration or re-calibration of an instrument after monitoring of quick-loop data.

SAC. Action Item:

S-1-12-16

SDC will incorporate lunar surface checklist task description by 20 January 1966.

SUMMARY

The Lunar Simulator tests to date have consisted mainly of removal and carrying tasks of the Central and Instrument Packages. The LSI attitude for these tests has included 10, 30, and 60 inch elevations plus front, back, and side tilting. The ground configuration for the above tests has included level cement, level peat moss, side slope peat moss, and slope peat moss. Three test subjects were utilized to perform the tasks; one of who is average astronaut (175 lb) physical size, one is light (141 lb), and one is heavy (197 lb).

Fourteen tests have been performed to date including six removal tasks and 8 carrying tasks; those tests performed are itemized under "contents".

The test results have brought out several important conclusions. The removal tests pointed out certain handle location inadequacies which will be covered later. The carrying tests showed decisively that carrying both packages rather than one at a time cuts down on subject fatigue and adds to the physical stability of the subject. Also noted was the fact that hand fatigue is the major restraining factor in carrying the packages. Also, any tilting of the carrying handle of the package contributes greatly to this hand fatigue because the subject must use muscular force to compensate for this tilting position.

Both the removal tasks and carrying tasks pointed out that: 1) one third weight packages are apparently too conservative for the test program, and 2) the estimated times for performance of the above tasks are very conservative (see ALSEP Removal and Carry Elapsed Time Summary).

A synopsis of task results is as follows:

a. Removal tasks:

- 1) The pallet handle on the Central Package should be re-positioned. During testing with the 10° elevation above waist height test subject must use the pallet handle with one hand while standing, and holding on the packages by placing the other hand on the packages. This is difficult handle in that it has two handles.

SUMMARY - continued

the C.G. lies above both hands it can easily tip and become unstable.

When the LEM elevation was at or below the knee this handle became useless as it was too low for the subject to grasp. A forward horizontal handle was then added, mounted behind the existing pullout handle. This handle allows the subject to pull the package out w/ another handle if required on the top aft area of the package to lower it to the ground.

2) The packages should be designed to sustain any bumping that might occur when removed from the LEM. When the Central Package is extracted from the LEM due to its mass it has a natural tendency for its soft end to drop. Two fins were ultimately broken on the TIG mockup because of this.

3) When the LEM is running in an uphill condition, i.e., the test subject is standing side slant after leaving the compartment, it is best to take advantage of the ground elevation change by letting both handles on the uphill side of the subject.

4) The clearance between the supplemental ion detector and the added forward horizontal handle (see A.1. above) was found to be inadequate. Pulling off the hand is restrained because of this condition.

5) Removal of packages with the LEM at a low elevation (below knee height) is the most severe burden on the test subject's balance. Alternative training should be conducted for this condition.

Carrying Risks

a) The incline and weight/LEM burdens may trip the subject's leg. When carrying weight, one side should be held on each side. If the package is dropped from the person's shoulder, this could result in a fall.

SUMMARY -- continued

- 2) Although the subject's hand fatigue is apparent (see above), the required distance (250') can be easily traversed without an interim rest period.
- 3) The Central Package forced tip drops in the test runs. This condition exists when traversing up-slope or side slope when the package is carried on the mobile side. Care must be taken of this so effort should be made to either elevate the package or sufficiently protect the package from this condition.
- 4) The destrucport package, when carried with the pullout handle always. This condition was eliminated when a handle was added to the top of the package for carrying. However, this handle is currently not in the weight center of gravity plane, consequently the package will be causing undue hand fatigue.

In conclusion, the findings do not bear out certain inadequacies in the design. However, these appear to be correctable without any changes in the basic methods for package removal and deployment.

FACILITY

No problems have occurred with the lower simulator and none are anticipated. The ramp has been successfully driven under loaded conditions. It should also be noted that test subjects are now capable of remaining in the harness for periods up to an hour without undue physical stress. During one test day, a subject walked approximately one mile in the simulator.

Aug 10

Reservoir and Sherry Lepesed
Time Measurements

	Mins	Min.	Average	Max. Walk
Reservoir Area				
(EM at 60° with 2000' sec. 1st walk)				
1) Level Densum	0.33	0.37	0.35	
2) Level Peat Moss	0.72	0.39	0.51	
3) Slope Peat Moss	1.51	0.99	0.39	
(EM at 30° with No slide or back walk)				
4) Level Peat Moss	0.32	0.28	0.32	
(EM at 10° with F'd. slide)				
5) Level Peat Moss	0.38	0.41	0.40	
6) Slope Peat Moss	0.59	0.22	0.22	
Walking Areas				
2000' Reservoir				
Level Densum	1.23	1.09	1.11	0.83
Level Pine Moss	1.35	1.13	1.21	0.62
Slo. Peat & Pine Moss	0.39	1.03	1.20	0.47
Slope Peat Moss	1.31	1.03	1.20	0.93
2000' Sherry Lepesed				
Mid Slope - wet moss	0.31	1.21	1.25	0.56
Slope - man. Moss	1.36	1.09	1.19	0.81
2000' Reservoir - Densum				
Mid Slope - wet Moss	0.32	1.03	1.06	0.50
Slope - wet Moss	1.28	1.02	1.17	0.79

100' sec

100' sec

PHASE II - TRAINING AND FAMILIARIZATION

	1966						1967																	
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A							
Revise and Coordinate Training Plan	-----			-----																				
Provide Training Equipment	Prep Spec			Design and Fabricate			Prel.			Acceptance ↑														
Prepare Training Manuals and Materials							Updated																	
Conduct Familiarization and Orientation Training							-----			-----														
Support Flight Crew Training													-----											
Train Ground Station Personnel													-----											
Train Ground Support Personnel													Classroom OJT -----											

D No. 1

The chart illustrates the progression of training activities over time, divided into three main phases:

- Initial Training Phase (1968-1969):** This phase covers the period from October 1968 to December 1969. It includes "Final" training (from Oct 1968 to Mar 1969), "General Training" (from Apr 1969 to Dec 1969), and "Preflight Training" (from Jan 1970 to Dec 1970). "Classroom OJT" was conducted during the first half of this phase.
- Deployment Phase (1969-1971):** This phase spans from January 1970 to December 1971. It involves four distinct deployment periods labeled D No. 2, D No. 3, D No. 4, and D No. 5. Each deployment period is preceded by a "Preflight Training" phase of approximately one month's duration.
- Post-Deployment Phase (1971):** This phase begins in January 1971 and continues through December 1971. It includes "Preflight Training" (Jan-Mar 1971) and "General Training" (Mar-Jun 1971).

DISCUSSION NOTES OF L-12 AIR BUREAU OPERATIONS

Possible Benefits:

Nonfunction could be corrected or isolated.

Astronaut might obtain data which would indicate cause of a failure.

Instrumentation time might be shortened if probe tips like those of a PLASSEP were found to be ineffective.

Arguments Against Checks:

Auxiliary equipment would consume weight that could be used to increase reliability or redundancy of instruments.

Probability that ACP will not beoperative is extremely small.

Instrument's time to respond is too long for use in operational mode.

Any extra time available for ACP to "think" would be spent in sending commands and getting answers, thus forbidding simultaneous alignment and repositioning of instruments.

Surveillance does not identify a diagnosable condition.

Corrigible Failures:

Voluntary abandonment of PLASSEP deployment operation would be indicated if the payload was unable to fit into the fairing. Unrecoverable physical damage, e.g., fuel clerical personnel error or other package jammed in tank or tank panel would be detected by a complete counting of each payload item. An appropriate corrective action will be undertaken in this situation if operational planning.

Other Safety & Safety-Related Items:

Major concern is the potential for damage to the PLASSEP probe during launch. If damage occurs, the probe must be replaced.

ITD-K

POWER MEETING

12 January 1966.

I. Attendees

MFC

FSC

J. Clegg

C. A. Lyndale

P. Kerecith

II. Discussion

A. Technical aspects of the Space-General MCU proposal were reviewed.

B. G.E. SEAL-27 mockup delivery will be directly to MFC. Mockups will be ready for shipment on 17 January and will include two full sets of GCU hardware, one at 1 g (qualified for dynamic environment) and one at 1/6 g.

C. Discussion of MFC delivery requirements and delivery dates indicated that:

1. MFC needs a definite indication of FSC hardware availability for system prototype bare purposes.

2. Only one (1) flight Simulator RIG is being delivered by G.E., and the SSI deliverables item requirement indicates two (2) are required.

3. G.E. delivery dates for flight RIG hardware are coincident with ALSEP system delivery. MFC desires at least two months lead for E1 Monitor system integration. Risks and possibilities for E1 integration and MFC in view of G.E. acceptance tests must be considered unless MFC delivery schedule is delayed.

4. Other aspects of the radiative delivery schedules appear generally acceptable.

5. An MFC letter reviewing the delivery schedule should be received at MFC shortly.

D. If notification is received from the MFC that it is considered a G.E. item, SSI will promptly provide the review, and MFC to update document radiative delivery schedule of the GCU.

POWER MEETING (Continued)

E. The following modifications in the RIG configuration are being considered. If these modifications become official, MSU will provide drawings reflecting same as soon as possible.

1. The generator barrel will be slightly increased in diameter.
2. Number of fins is decreased from 12 to 8 (cylindrical external envelope remains the same).
3. Bolt circle remains the same.
4. A black coating ($\alpha = 1.0$, $\epsilon = .65$) will be used.

F. Specific definition of RIG status data interface (as discussed with G.E. during previous coordination meetings) will be required by G.E. by 21 January.

III. Action Items

S-1-12-C5

MSG will officially indicate whether the MU is QM or CM by 20 January with response by CMCOM.

~~CONFIDENTIAL~~

COST AND MANUFACTURER MEETING

12 January 1966

I. Attendees

MSC

J. Church
D. Cherry
O. Weilert

SAC

J. Dreisbach
R. Kaplan
R. MacCracken

II. Discussion

A. MSC advised that Array A of instruments includes the following instruments listed in the order of their priority:

Primary Experiments

1. Passive Seismometer
2. Magnetometer (GRB)
3. Plasma Detector (SPD)
4. Suprathermal Ion Detector (STD)

Backup Experiments

1. Heat Flow
2. Electron Proton
3. The Active Seismometer

Array B of instruments in order of priority is as follows:

Primary Experiments

1. Passive Seismometer
2. Active Seismometer
3. Heat Flow
4. Suprathermal Ion Detector (STD)

Backup Experiments

1. Magnetometer (GRB)
2. Plasma Detector (SPD)
3. Radiation Dosimeter (RAD)

COST AND MAN-POWER MEETING (Continued)

B. MSC advised that Space-General should be prepared to price in current GFE instruments or price out current CFE instruments during the course of the Phase II negotiations.

C. MSC advised that the primary cost reporting during Phase II will be by Management Control Plan. Supplemental cost reporting, broken down to hardware at the subsystem level is also required.

D. MSC advised that biweekly telephone communication with principal investigators will be required during Phase II to maintain status awareness and to obtain data for PERF reporting. SGC is to include this effort in their cost proposal.

E. MSC advised that in the Phase I Exhibit B the reference to NEC 200-4A should be NEC 200-4.

F. MSC advised that it is the intent that both Phase I proposals be delivered to MSC.

G. MSC advised officially that the SGC facilities survey would occur on 2 February and that the FME would occur on 3 February.

H. MSC plans to accelerate activity at the end of Phase I in order to shorten the gap between Phase I and Phase II, and accordingly the Phase I presentation currently scheduled to occur after the end of Phase I will commence on 15 February from 1 to 5 p.m. at MFC. SGC's proposal, including all Phase I deliverable documentation, is required at that time. The Final Design concept and a discussion of the proposal would be included in this Phase I presentation. It is currently planned to initiate Phase II negotiations on 17 February. SGC stated that they agreed to this request.

I. The cost proposal should be broken down per Management Control Plan and for each Management Control Plan include the following items:

1. A cover sheet which includes labor codes, rates, burden, and a management control plan total, not agreed to yet.
2. A spread of labor culture, material, and other direct costs by category, by month including burden.
3. A detailed listing of the other direct costs including each things as separate entries, i.e., Rate is a total only, not annual.
4. A graph of cost over time of duration - month.

COST AND MANPOWER KEEPING (Continued)

J. The cost proposal summary should include:

1. A cover sheet identifying labor codes, rates, burden in total, not spread.
2. Total manpower per month.
3. Total labor dollars per month.
4. Total material dollars per month.
5. Total of other direct costs per month.
6. A total cost per month with a sum line.
7. Other detail as specified by MSC, no later than 26 January 1966.

III. Document Transmitted

A. MSC provided summary sheets of information pertinent to cost proposal. (Figures 1-A, 1-B and 1-C.)

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– **Introducing combinations of programs**

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177. — *Leucostoma* *luteum* (L.) Pers.

Grand Totem

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I. Graphs for each M.F.

By Month for Contract

Direct Labor M/F in KMF

Total M/F \$

II. Backup Data

Listing of Material and \$

Listing of Other Direct and \$

List No. Days by Localization and \$

List Facilities and \$

List Consultants and \$

Other by Item and \$

cc:

RECORDED ON COMPUTER
BY COMPUTER SYSTEMS INC.

Sum of Management Control Plans

Total Manpower \$ (Direct) Spread by Month

Total Manpower N/M (Direct) Spread by Month

Total Manpower Burden Spread by Month

Material \$ Spread by Month

Material Burden Spread by Month

Other Direct \$ Spread by Month

Other Direct Burden Spread by Month

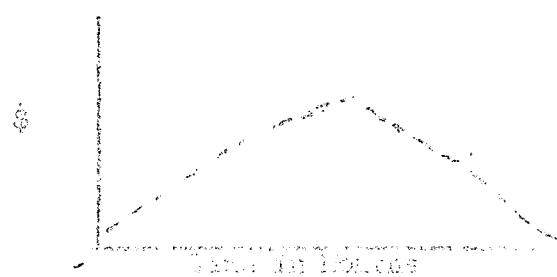
G&A \$ Spread by Month

Total Cost Direct Fee Spread by Month

Graphs for summary

Total Labor	(M/M)
Total Labor	(\$)
Total Material	(%)
Total Other Direct	(%)

Total Cost Rate & Comm



JULY

INITIATIVE MEETING

12 January 1966.

X. Attendees

MSC

Bob Vale
Don Cherry

USC

R. J. Kaplan
R. H. MacCracken
A. Richwood

XI. Discussion

A. The structure of the Phase II Initiative Plan was discussed, including a review of a preliminary draft received from USC dated 11 January 1966. In addition to incentive provisions, other provisions of the contract and terms and conditions were discussed. Generally, Space-General found the incentive provisions off red by USC to be consistent with work done to date by SGI and for the most part acceptable.

B. Space-General stated that they would prefer noncumulative step escalations for point increases and a 10% minimum increase. The completion of the qualification test program will be defined as the end of qualification testing and will be contingent upon a formalized review and publication of a final test report. Options or failure during the qualification program will be as defined in the Phase I CFI Initiative Test Plan as negotiated. It is stated that the incentive point awards will be made in a progressive fashion i.e., the later the delivery the greater the loss of incentive points. Incentive instruments will be added to primary groups according to the priority ranking listed below until no approval is obtained.

Array A Primary Requirements

1. Passive Seismometer
2. Magnetometer
3. Fluxgate Detector
4. Ion Detector

Array B Primary Requirements

1. Passive Seismometer
2. Active Seismometer
3. Heat Flow
4. Ion Detector

Array A Major Requirements

5. Heat Flow
6. Filtered-located
7. Active Seismometer

Array B Major Requirements

5. Magnetometer
6. Fluxgate Detector
7. Microseismometer

EXECUTIVE MEETING (Continued)

C. EOC stated that the maximum complement of instruments is not attainable and therefore should not be equated to the maximum number of points. In Space Shuttle's response to the action item S-12-08 definition of central surface height and power will be provided. Also, the relative point values for laser operation w/ GNC and OSE instruments will be proposed, as well as specifications for end failure while on the lunar surface. EOC stated where they had considered a fee range of 0 to 15%.

E.II. Action Items:

S-12-08

EOC will submit to NSC by 30 January 1996 detailed transition plan for the Phase IV contract based upon today's discussion and the ESE submitted plan.

S-12-09

EOC will provide by 30 January 1996 or earlier corrective definition of scientific data displayed in Figures 2A & 2B of the ESE Plan.

S-12-10

EOC will provide to NSC by 10 February 1996 a listing of applicable building rules and factors for the Phase IV point proposal.

S-12-11

EOC to provide to NSC by 30 January 1996 via E-mail or letter comments on the preliminary draft of the draft U/C contract Terms and Conditions.

S-12-12

NSF shall by 30 January 1996 submit to NSC a list of the responses to the Phase I contract including all changes in the contract made so far.

E.III. Document Transmissions:

A. Document AL-2-009 dated 12 January 1996, "Laser Transition Plan."

B. 4.17 Rev 10 day 1000' from (approximately 6000').

C. MSL Polar Images: 2000' to 1000'

EEEN

INTEGRATION REVIEW MEETING

12 January 1966

I. Attendance

MSO

SAC

O. Miller

Brodhead

II. Discussion

A. ESEN and SAC regarding the Program Control.

B. PERI preparing based on standard NASA task and component
Cost or equivalent for us to follow:

For Total Program listing of functions in accordance with
Approved Configuration at the last point Rev. (3)
January 1965 and revised Jan. 2000.

For Plan Theory and General Basis:

Approved Configuration and Planning.
Listings of Configuration and Associated Components
- 20 pages and 100 pages.

C. ESEN Programs and specific mounts in place with all components
calculated. Configuration planning has been done (1) and (2) for
different types of the existing design.

The 1st option (1) is the one best suited (3). Second best choice
of configuration would be:

D. Financial Requirements Programs one C, one D, one E (10) estimation
Cost effect of different options and cost of (10) estimation costs
other areas of program activities.

III. Action Items

Review of:

MSO will provide different programs or tasks for UG drawing 10-16.

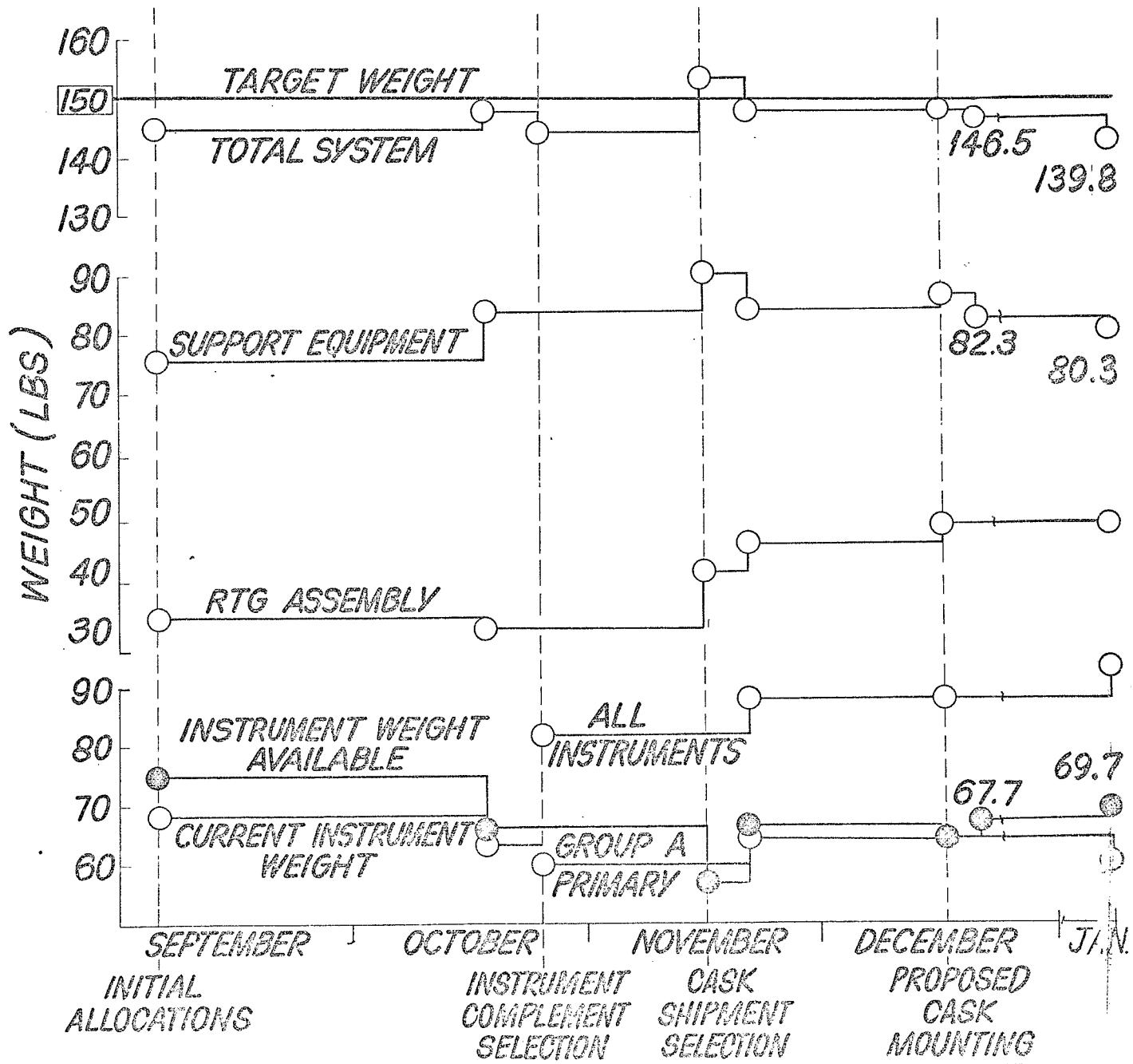
Review of:

Cost - 100

Cost - 100

ALSEP SYSTEM WEIGHT CHRONOLOGY

15 DECEMBER, 1965



09/439

Revised 12 Jan 66
Fig. IV-1

